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# USSR Report

## SCIENCE AND TECHNOLOGY POLICY



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# USSR REPORT

## SCIENCE AND TECHNOLOGY POLICY

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ORGANIZATION, PLANNING AND COORDINATION

ROLE OF SECTORIAL SCIENCE IN INTRODUCTION OF ACHIEVEMENTS

Moscow IZVESTIYA in Russian 30 May 86 p 1

[Article: "The Pace of Introduction Is Greater"]

[Text] Sectorial science was severely and deservedly criticized at the 27th CPSU Congress. It was noted that many institutes remain a continuation of the staff of ministries, frequently perform the role of advocates of departmental interests, and have become bogged down in routine and the writing of documents. Sectorial organizations frequently mark time for years and run idle, their activity has lost its creative nature and is characterized by work on minor themes and the dispersal of forces and assets. The ambitions of individual groups of scientists and departmental hostility toward "others'" inventions are frequently the basis for the attitude toward what is new.

All this had the result that important scientific and technical innovations for years, or else for decades, do not find practical application. Among them are fundamentally new lubricants, high-torque hydraulic motors, bearings with an antifriction filler, and much more. More than 300 completed developments, which it is possible to introduce and which are not being introduced, have accumulated at the institutes of the USSR Academy of Sciences. The situation with developments of scientists of the higher school and many effective inventions is similar.

The party congress set the task: to resolutely reorganize sectorial science, to bring it as close as possible to production, to strengthen the material and especially the experimental design base, to supply modern instruments and scientific equipment. It is obliged to bear full responsibility for the scientific and technical level of its sector.

The strengthening of the plant sector of science should become an important component in the accomplishment of this task. Such leading associations as the Elektrosila and Uralmash Associations and the Ivanovo Machine Tool Building Production Association, the products of which--NC machine tools--are in demand not only in our country, but also in such industrially developed countries as Japan, France, and the FRG, are obliged for their reputation precisely to plant scientists, designers, and process engineers--the enthusiasts of retooling. It is necessary, it was emphasized at the congress, to develop the plant sector of science at a leading pace, to boldly include

within it sectorial scientific research institutes, and to carry out more rapidly the work on the organization of scientific production associations.

Quite a number of important decisions, which are aimed at the creation of the necessary economic, social, and organizational prerequisites for the creative labor of engineers, scientists, and designers, the increase of their social prestige, and the stimulation of labor, have been made in recent months. But, unfortunately, they are not being implemented rapidly enough. In particular, at one time many managers insisted on the introduction of new forms of the remuneration of the labor of scientists and technical personnel, which make it possible to stimulate a high creative return and to overcome leveling trends. A special decree was adopted on this question. However, at enterprises and associations they are changing over to these forms of remuneration unjustifiably slowly.

Some ministries instead of analyzing the activity of the scientific research institute and design bureaus, which are subordinate to them, and taking steps on stimulating their work confined themselves to orders on the reduction of the staffs of these organizations according to the principle "to all the sisters a set of earrings each." All this attests to how strong the inertia in questions of scientific and technical progress is.

This disease has also not been eliminated in the sphere of the production of new equipment. According to the data of the USSR Central Statistical Administration, during the first quarter of the five-year plan the fulfillment of the assignments of the plan of the development of science and technology was not completely ensured, fewer such highly efficient products as iron powders, components of pipelines made of thermosoftening plastics, pneumatic rapier looms, and stations for the complete mechanization of finishing operations in construction were produced than planned. Slowness at the start by the end of the year can lead to a substantial lag, and it is possible to correct the situation only by resolute measures, and not at all by adjustments of the plan, which in a number of cases are, unfortunately, already occurring.

The work on speeding up the introduction of advanced innovations on an intersectorial scale is also being carried out at an inadequate pace. In particular, the decision has been made to establish in the country interbranch scientific technical complexes which are a new effective form of the combination of science and production. They should ensure the extensive introduction of advanced equipment and technology in the main directions of scientific and technical progress--such ones as membrane technologies, laser equipment, powder metallurgy, and so on. However, a significant portion of these complexes for the present exists only on paper, the model statute on them has not been approved. A commission, which has been charged to select and recommend for inclusion in the national economic plans the most effective inventions, has been established under the USSR State Planning Committee. The results of the work of this commission for the present are not visible.

In the accomplishment of the new tasks in the area of scientific and technical policy much depends on the USSR State Committee for Science and Technology. It needs to increase the demandingness in the evaluation of the conformity of the equipment being developed to the world level and to step up the search for

economic methods, which are aimed at speeding up the introduction of new machines, equipment, and instruments.

The 12th Five-Year Plan should become a crucial stage in the thorough renovation of the national economy of our country. The leading enterprises have already actively joined in this work--programs of the continuous updating of production are being drawn up, the optimum means of their implementation are being outlined. The pace of reorganization is increasing, and no one ought to stand aloof of it.

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CSO: 1814/243

ORGANIZATION, PLANNING AND COORDINATION

## PROBLEMS IN PRODUCTION, USE OF NEW MINERALS

Moscow PRAVDA in Russian 21 Jul 86 p 2

[Article by Academician N. Logachev, director of the Institute of the Earth's Crust and chairman of the Presidium of the Far Eastern Affiliate of the Siberian Department of the USSR Academy of Sciences, Professor V. Vereshchagin, head of the Chair of Technology of Silicates of Tomsk Polytechnical Institute, and Candidate of Geological Sciences L. Reznitskiy, senior scientific associate of the Institute of the Earth's Crust, under the rubric "Reserves: The Comprehensive Approach" (Tomsk-Irkutsk): "The Sphere of Introduction"; first paragraph is PRAVDA introduction]

[Text] Today the party is justly requiring science to turn resolutely toward the needs of production and to expand applied research. But, as life shows, the weakest link is not science itself, but the transition from it to production, that is, introduction.

Precisely introduction is the greatest bottleneck, the area of "skidding," where promising developments and initiatives frequently become bogged down and even perish. It is easier when the matter concerns the improvement and rationalization of what is known, while development and introduction are carried out in one sector. But what if it is a question of something fundamentally new, which arises at the juncture of different organizations, departments, and ministries? Then introduction becomes at times an excrutiatingly protracted and difficult procedure.

We represent science of the higher educational institution and academic science: Tomsk Polytechnical Institute and the Institute of the Earth's Crust of the Siberian Department of the USSR Academy of Sciences, which is located in Irkutsk. Together we are studying mineral resources and are working on the problem of their efficient use.

At remote Aldan for many years they have been mining phlogosite. The miners are working not too profitably. The remoteness of the region and the fact that they are extracting from the depths much more "barren" rock than mica are having an effect. Process engineers and miners have also taken an interest in the diopside rock. Diopsides, it turned out, are a valuable raw material. It is possible to obtain from it, in particular, mineral wool. The Bestyakh Plant of Reinforced Concrete Items in Yakutia quickly organized its production

in accordance with our recommendations. The economic impact exceeded 250,000 rubles a year.

Why did this succeed? Because literally everyone: the higher educational institution, the plant, and the Aldanslyuda Mining and Ore Dressing Combine of the USSR Ministry of the Construction Materials Industry, were interested in introduction. The work was directly coordinated by the former chief geologist of the Nonmetallic Ores Industry Main Administration of this ministry, who had real opportunities and powers.

But here is another example. Geologists of the Institute of the Earth's Crust for a number of years have been conducting research on the complete evaluation of the mineral resources of Slyudyanskiy Rayon, one of the oldest mining industry regions of Eastern Siberia. The work is being performed within the framework of the well-known Sibir Program in accordance with the section "The Resources of the Basin of Lake Baykal."

Having learned of the success at Aldan, the Irkutsk geologists immediately established contacts with the Tomsk process engineers. They began joint research without waiting for official agreements, in order not to lose time. The geologists of the institute in Irkutsk identified promising types of rocks, took samples, and sent them to Tomsk. The Chair of Technology of Silicates of Tomsk Polytechnical Institute conducted comprehensive tests. Interesting results were obtained. In Slyudyanskiy Rayon, in addition to rocks of the Aldan type, there are also snow-white diopsides without the undesirable iron impurity. Similar rocks have not been identified anywhere else in the world. A rare new raw material had been found.

On the basis of iron-free diopsides compounds of ceramic pastes were produced and the technology of the production of facing tile and dielectrics was developed. Obviously, it will be possible to use iron-free diopsides in the production of porcelain, untreated glazes, ceramic pigments, and other materials.

The flow charts were checked on samples of the Institute of the Earth's Crust in shops of the Tomsk Plant of Ceramic Materials and Items, the Angara Ceramics Plant, and enterprises for the production of porcelain and dielectrics. The Tomsk Plant, which had already tested the Aldan diopside rocks, obtained from ceramic tile of the highest quality category from the Slyudyanskiy Rayon raw material. The enterprise is ready to use the Slyudyanskiy Rayon raw material constantly for the production of ceramic facade tile. The promise of the use of similar diopsides when producing dielectrics was also demonstrated. This is making it possible to increase the quality of items and to reduce energy expenditures.

It is possible to use the raw material already during the current five-year plan. It is a matter of large-tonnage industrial tests. And it is here that the work came to a standstill. The essence of the matter is the following. If the reserves of a raw material have been exhausted or it has worsened appreciably, the plant usually turns to its ministry, while the ministry turns to the Ministry of Geology. Union and republic ministries and their territorial production associations are engaged in the search for and

prospecting of minerals. There is also such an association in Irkutsk Oblast--the Irkutskgeologiya Association of the RSFSR Ministry of Geology. So that the people of Irkutsk would begin the prospecting of diopside, they should receive an assignment of the ministry, which in turn needs an order of the customer. In our case this is the USSR Ministry of the Construction Materials Industry. It seems inconvenient for the latter to issue an order for the prospecting of iron-free rocks: for the present there are no plants which use this raw material--such a raw material is not on any lists, registers, and cadasters of minerals. For it is new!

Hence, should the plants begin? There they are well informed. But what kind of enterprise would take the risk to order a new raw material, before it has undergone industrial tests? The plant needs to "run" tens and hundreds of tons of raw material over its technological lines, to obtain a large batch of the product, to test everything, and to be convinced that the items comply with the standards and all-union state standards, or, even better, surpass them.

The plants agreed to conduct the tests. But how are the large-tonnage samples to be delivered? This is beyond the power of the academic institute. Will the geologist-production workers, perhaps, undertake the matter? Yes, they do have such possibilities, but do not have the rights. Plant tests are conducted at the final, detailed stages of the prospecting of deposits, not earlier, and until the geologists have begun at least the prospecting and evaluation work, they officially do not have the right to send to the enterprise even 100-200 kilograms of raw material.

So that plants and their ministries would plan the changeover to the new raw material, it is necessary to have large deposits of it. But such ones...do not exist. Do not be surprised: in practice they exist, officially they do not. A deposit exists, when it in accordance with all the regulations has been prospected, has been accepted by the state commission for reserves, and has been placed on the balance sheet of the country. Here we have returned to that with which we began: How is one to begin the evaluation of a deposit?

If the Irkutskgeologiya Association now engages in the evaluation of the diopside raw material, all the technological tests will have to be started from zero, from laboratory research. For a regulated list of sectorial institutes, whose conclusions are official, mandatory documents in case of the evaluation of deposits, exists. While geologist-production workers can merely make a note of the developments and recommendations of academic laboratories and laboratories of higher educational institutions. But they can also not take note of them. The entire procedure up to the placement of deposits into use takes not less than 10-15 years.

What is the result? The geologists do not have an assignment from the Ministry of Geology, while it does not have orders of the Ministry of the Construction Materials Industry, to which plants do not turn, since the geologists are not giving it anything. The circle is closed....

Alas, the case with diopside rocks is not the only one. It is appropriate to recall wollastonite--a mineral with a very broad area of application. It is

in great demand on the international market, the consumption of this type of raw material is increasing, but not in our country: domestic industry is stubbornly ignoring it.

It seems that the time has come to deal in earnest with the improvement of the organizational and legal forms of the interaction of science and production. We see a way out of the situation in the establishment of temporary interdepartmental collectives of introduction, which have been given not only duties and responsibility, but also rights. In particular, for the better organization of the work on the assimilation of new technologies and materials on the basis of the iron-free diopside and wollastonite raw materials of Slyudyanskiy Rayon it is advisable to establish a temporary collective made up of representatives of the Irkutsk and Tomsk Oblast Committees of the CPSU, the Institute of the Earth's Crust of the Siberian Department of the USSR Academy of Sciences, Tomsk Polytechnical Institute of the RSFSR Ministry of Higher and Secondary Specialized Education, the Irkutskgeologiya Association, the Angara and Tomsk Ceramic Plants, and other enterprises, which are interested in new types of mineral raw materials.

Of course, other versions of the solution of the problem are possible. It is intolerable that important scientific recommendations would not be used for long years in production. The decisions of the party congress are aimed at a new style of work, which will help to remove interdepartmental barriers, to break the agonizing chain of consultations, and to abandon already obsolete instructions.

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## DEPARTMENTAL BARRIERS BETWEEN BASIC, APPLIED SCIENCE

Moscow MOSKOVSKAYA PRAVDA in Russian 15 Mar 85 pp 1-2

[Article by Academician V. Struminskiy, winner of the Lenin Prize and State Prizes, under the rubric "By the Course of Acceleration": "Establish Scientific Outposts"]

[Text] Domestic applied science has attained very substantial achievements. Thus, on the basis of achievements of basic science our aviation for the first time in the world broke the sound barrier, the gravitational barrier was broken for the first time in the USSR--both our satellites and manned spacecraft have gone into space.... It would be possible to cite many more similar examples. However, in the development of many scientific and technical directions we do not hold today the most advanced positions and are forced to orient ourselves toward foreign technologies and equipment.

Such a state of affairs, apparently, is due to a large number of factors which seriously worry our scientific and technical community. That is why Soviet scientists perceived with enormous satisfaction the decisions of the 27th party congress, which are aimed at the acceleration of scientific and technical progress, the elimination of poor management, and the increase of labor and production discipline. Here the fact that it is a question not simply of acceleration, but, as M.S. Gorbachev emphasizes, of radical changes and the changeover to fundamentally new technological systems, which will make it possible to develop a new generation of the most advanced machines and units and thereby to increase labor productivity and the well-being of the people, is especially gratifying.

Technology changed long ago into a leading area of the activity of mankind. Enormous importance is being attached to it everywhere.

I know this from my own experience: I supervised model studies of several most prevalent technological reactors and units. The reserves of technology proved to be colossal! I believe that today it is especially important to speak about this and the other reserves of technical progress and about what it is necessary to do for its radical acceleration, which was spoken about so convincingly in the Policy Report at the 27th party congress.

First of all it is necessary to never forget that in our times, in the age of the scientific and technical revolution of the 20th century, which is developing rapidly in all the economically developed countries of the world, in the course of narrow specialization the content of science changed. Serious contradictions arose between the new content of scientific and technical research and the old forms of its organization. What is called the "barrier of incomprehension," which led to a large number of negative phenomena in science and technology, formed between scientists and engineers of various specialties.

The barrier of incomprehension, which arose as a consequence of narrow specialization, first between the theoretical scientists working in the field of the basic sciences, then in the field of the technical sciences, now, apparently, has already begun to appear in purely production engineering spheres of activity.

The appearance of this barrier first led to the decrease of the efficiency of scientific centers, universities, and institutes of the broad scientific type, which were developing the basic sciences. For the solution of the most difficult, clearly defined scientific problems individual firms and corporations in the West began long ago to establish their own small special scientific and technical organizations. The Rand Corporation, for example, is luring talented scientists with high pay and is creating for them all the necessary conditions for creatively active work. The efficiency of the operation of these small organizations surpassed all expectations and found the broadest dissemination not in the United States, they "migrated" to Western Europe and Japan. Precisely these organizations ensured in the United States technical progress in the solution of not only global problems, but also an enormous number of individual, more minor, secondary problems which are of the greatest importance for the economy and the development of new advanced technology and a new generation of machines.

I do not consider it necessary to copy this experience blindly, but I want to stress: the scientific and technical revolution is advancing, in my opinion, the need to find in our country as well effective steps for the establishment for creatively active scientists of small independent scientific organizations for the solution of specific, acutely pressing problems, while providing them with personnel and the necessary experimental base. Incidentally, a similar process also affected industry. In the interesting book "Small Is Beautiful," which was published in large editions in a number of countries, interesting examples of the activity of individual firms and companies are cited. Small firms per dollar of investments in scientific research work yielded fourfold more innovations than medium-sized companies and twenty-fourfold more than large companies.

However, let us return to the organization of science in our country. Our science is based mainly on large institutes of the broad scientific type. At times such scientific institutes are similar to an Egyptian pyramid--in them it is just as difficult to find a new original development as it is to find in a pyramid the burial site of the treasures.

A series of reorganizations in science were also carried out in our country. Large institutes of the broad scientific type were divided into smaller ones. These reorganizations often dragged out for many years, as, for example, was the case with the Institute of Physics of the USSR Academy of sciences. At times specialized subdivisions: a department (M.V. Keldysh), a laboratory (P.L. Kapitsa), a sector (N.V. Melnikov), emerged from institutes of the broad scientific type. These measures always led to the substantial acceleration of the pace of development of science and to the introduction of its achievements in production. However, the reorganizations dragged out for a long time, since they involved numerous consultations, which does not satisfy at all the requirements of the times, which were reflected in the decisions of the 27th party congress.

A series of decisions on the establishment of intersectorial temporary laboratories appeared in the 1980's. However, the procedure of their establishment is also very complicated. The scientist-organizer needs in the course of approximately 1.5-2 years to go to numerous instances in order to establish for his research a temporary laboratory for a term of 3 years. It is necessary to find in a hurry more simple and necessarily more efficient means of creating the necessary conditions for the elaboration of acutely urgent scientific and technical problems. I will tell about our experience.

The great reserves in a series of technological reactors and units were spoken about above. Means of using these reserves were also found. After becoming familiar with these materials President of the USSR Academy of Sciences Academician A.P. Aleksandrov considered it necessary to develop this direction further. He formed it into a small independent scientific subdivision--the Sector of Mechanics of Heterogeneous Media attached to the Mechanics and Control Processes Department of the USSR Academy of Sciences, which carries out the scientific and scientific methods supervision. The sector has its own departments and laboratories and its own scientific council. The plan is approved by the department of the USSR Academy of Sciences. The manager of the sector selects and with the assistance of the scientific council places personnel. He reports back annually on the results of the work to the department. The financial support of the sector has been assigned to the Institute of High Temperatures of the USSR Academy of Sciences. The sector belongs to it as an independent subdivision, having a separate budget and its own account at the rayon division of the USSR State Bank.

The fact that the management of the new organization was assigned to an academician, who himself is engaged in the elaboration of these problems and is a well-known scientist in this field, was of great importance. In a record short time the scientists of the sector were the first to solve a number of basic theoretical problems in the mechanics of gaseous mixtures and flows of gas and liquid with solid impurities. This great theoretical undertaking made it possible to reveal significant reserves and to determine means of their use.

A number of theoretical inferences were confirmed in the sector experimentally, and then by pilot industrial tests.

As is evident, the advanced theory--the kinetic theory of gases--has turned into a productive force and is increasing the efficiency of technological processes at the combine with an economic impact on the order of 1 million rubles a year. The technological process at several tens of other combines of the country can be intensified in a similar manner.

Today it is necessary not to drag out the establishment of scientific outposts--small independent goal-oriented organizations, but to use the experience of the USSR Academy of Sciences and to oblige all executives of ministries and departments after the careful selection of creatively active, leading scientists to establish under their supervision independent scientific and technical organizations for the solution of acutely urgent, clearly stated problems (on the basis of the number of institutes of the broad scientific and technical type).

But let us return to our sector. The introduction of the new technology, which was developed by it, was greeted with significant opposition. What is the matter? Why did sectorial scientific and administrative organizations not give proper assistance? This is explained by at least two factors: on the one hand, significant isolation formed, a "China wall" arose between the basic and applied sciences and, on the other, the aspiration of superior executives to preserve the monopoly on all the scientific and technical developments of their sector is great.

Now in many countries considerable efforts are being exerted to surmount this "wall." Firms are displaying great concern about the increase of the scientific and technical range of view of their staff members, organizing for them the giving of lectures by leading scientists and sending them to all kinds of conferences. However, we, for example, have not been able to organize the giving of similar lectures even as a voluntary service, in spite of the appeal to the management personnel of the ministries and to the State Committee for Science and Technology. The "wall" between the basic and applied sciences continues to stand firm.

I believe that in light of the demands of the 27th party congress and the Basic Directions, which were adopted by it, urgent steps are necessary for the fundamental unification of basic and applied science. It is necessary, in particular, to create all the necessary conditions for the scientists who are making a creative contribution to the development of both science and technology. It is necessary for the executives of the main sectorial organizations to enlist our creatively active scientists for consultations, the regular giving of lectures, work through the combining of jobs, and so on. It is necessary to oblige the executives of ministries and departments to use the creatively active scientists of our country, as well as the countries of the socialist community for the increase of the scientific and technical level of the leading sectors of industry and the national economy.

For the present "monopolism" is a quite prevalent phenomenon at our scientific and industrial organizations. At sectorial ministries and departments it has been brought up to the highest degree of "perfection." All approaches and paths to "the heights" have been blocked and "mined." All the paid and unpaid positions are distributed among their own services. It is not surprising,

therefore, that many responsible officials and scientists hold more than 10 positions each, with which they are absolutely not coping, while doing serious harm to the pace of the development of technical progress and the advance of new personnel.

Of course, under these conditions the rising generation of scientists often finds itself in a difficult position. Many of the talented scientists, having reached the age of 40-50, have even not been able to defend their doctoral dissertations and to perform important independent work. "Monopolism" is visibly hindering the development of the economic potential of the country.

There are many means for combating interdepartmental barriers. In particular, it makes sense to organize in the press the prompt and analytical criticism of all factors of the display of "sectorial monopolism" with a rough estimate of the harm done to the country. While it is necessary to punish severely the guilty parties. I believe that in the most crucial sections of the scientific and technical revolution it is necessary to establish organizations which compete with each other and to hold a kind of competition of developments. There are also many other means to speed up the origination and introduction of new technologies. Scientists and production workers should use them fully--the decisions of the party congress require this.

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## ECONOMIC, ORGANIZATIONAL PROBLEMS OF ACCELERATING PROGRESS

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 8, 22 Apr-5 May 86 p 3

[Interview with Corresponding Member of the USSR Academy of Sciences V.L. Makarov, director of the Central Institute of Economics and Mathematics of the USSR Academy of Sciences, by NTR: PROBLEMY I RESHENIYA correspondent A. Mikhaylov under the rubric "The Economics of Acceleration": "The Cost of Updating"; date, place, and occasion not given; first paragraph is NTR: PROBLEMY I RESHENIYA introduction]

[Text] Corresponding Member of the USSR Academy of Sciences V.L. Makarov, director of the Central Institute of Economics and Mathematics of the USSR Academy of Sciences, responding to the questions of our correspondent A. Mikhaylov, touches upon the economic and organizational problems of the acceleration of scientific and technical progress.

[Question] The acceleration of scientific and technical progress, as is emphasized in the decisions of the 27th CPSU Congress, directly depends on the use of new equipment in production. But why does it prove for the present to be now advantageous and now not for the users?

[Answer] The advantage from any machine, equipment, and instrument is determined in case of the comparison of the expenditures on their acquisition and operation with the saving into which it will develop for the user.

The user is interested most of all in the high quality of new equipment. He always looks at it from the standpoint of performance and durability, reckons the amount of the operating costs, and compares comprehensively the "old" and the "new." If it is considered that the outlays on the operation of equipment, as a rule, are substantially greater than the expenditures on its development, it is possible to understand the user who dreams about a novelty with the smallest possible operating costs per unit of effective work.

[Question] Here it is probably appropriate to touch upon the question of the prices of new equipment....

[Answer] To increase their influence on the acceleration of scientific and technical progress is one of the urgent problems, which was discussed at the party congress. Prices--ideally--are called upon to ensure the constant

influx of new equipment into the national economy. And when establishing them it is necessary to consider without fail the technical and economic characteristics of new equipment and its consumer properties.

[Question] It is well known that the profitability of production--the most important component of the development of productive forces--is the basis of expanded reproduction. But the large "time lag" existing today in the very system of the formation and revision of prices is leading to a disproportion between them and the socially necessary expenditures on production. To what is this leading in practice?

[Answer] Here, for example, the coal industry has become unprofitable. Today the miners are forced to mine coal at a great depth and to commit to the economic turnover hard to reach and thinner seams. At the same time, we will not forget, in recent years the prices of construction materials have been increased, the cost of machines and devices has increased, intersectorial services have also not become less expensive. In short, the socially necessary expenditures on the mining of a ton of coal have increased, while the prices for it have lagged behind this increase. It is also possible to observe a similar picture in several other sectors of the national economy. In them, incidentally, most often there is also not enough money for retooling--the expenditures on new equipment are also increasing, since its complexity is constantly increasing. The executives of some departments see a way out of the formed situation in the constant appealing for additional budget allocations: the unbalance of prices is making such sectors unprofitable, and they simply do not have the assets for technical renovation and the introduction of the latest achievements of science and technology. But miracles do not happen in the economy. The additional allocations do not appear out of the air, they are taken from other, profitable and leading enterprises. As a result scientific and technical progress is also hindered there.

[Question] In order to overcome the hindrance, should one probably make serious corrections in the policy of prices?

[Answer] The axiom of retooling is: the development of new equipment and the modernization of existing equipment should always involve the decrease of expenditures per unit of useful work being performed by it. Two simple, but very important conclusions follow from this. First, it is necessary to make the prices of new equipment directly dependent on its consumer properties. For new equipment is not an end in itself, but merely a means of meeting one social need or another. And, second, one must not in any case allow the assimilation of the production of new equipment to worsen the indicators of the enterprise which has undertaken this. Hence, the prices should not only compensate for the losses of the enterprise in the production volumes and stimulation funds, but also increase without fail the interest in constantly updating the output being produced.

[Question] Thus, let us imagine: an enterprise has begun to produce more advanced equipment. It is idle less, the operating expenses decreased. Undoubtedly, the consumer gains from this, since an additional profit emerges for him. But how is it possible to interest the manufacturing enterprise?

[Answer] It seems that it is possible to do this by redistributing this profit between the producer and the consumer. For example, to give a part of the revenue to the developers and producers of the equipment, another to the consumer, and to send yet another to the state budget. Planning organs should establish what these "parts" should be, by direct attention to the economic impact in the national economy.

[Question] It is probably possible to stimulate the interest of production workers in the acceleration of scientific and technical progress by the intelligent use of already existing indicators....

[Answer] Yes, but I would immediately like to make a stipulation. For example, an enterprise achieves a high indicator with respect to the standard net output during the first years of the assimilation of new equipment, since the labor intensiveness of production objectively increases. But the idea of scientific and technical progress objectively consists in exactly the opposite. We need to introduce all kinds of improvements in order to drastically decrease this labor intensiveness.

Similar shortcomings, true, to a smaller degree, are also characteristic of other volume indicators. They not only do not "prompt" enterprises to the decrease of the expenditures of raw materials, energy, and material and technical resources, but at times directly hinder this. Practice is attempting somehow to overcome the imperfection of volume indicators. Such planned evaluation criteria as the increase of products of the highest quality category and the fulfillment of the assignments on the decrease of their production cost have been introduced, limits of the expenditures of basic materials have been established, and so on. They are called upon to shift the center of gravity from quantitative to qualitative indicators. The decisions of the 27th CPSU Congress direct our attention precisely to this. They require the improvement of the system of prices in order to reflect more completely precisely the qualitative indicators.

[Question] Let us now proceed to the concerns of those who use new equipment and technology, let us dwell on the problems with which the consumer is faced.

[Answer] At present the USSR State Planning Committee is the actual client of all the basic national economic output. The interaction of consumers and producers in this case, as a rule, takes place only in the process of coordinating the requirements for products which are being acquired in accordance with the funds. Due to this the responsibility of the client for the development of what is new has decreased entirely unjustifiably. In a number of instances the functions of the client have gradually been transferred to the sectors which produce the products. The consequences of such a "change of roles" are can be seen well: some producing sectors are beginning to dictate to the consumer what equipment he needs....

[Question] How is one to change the situation, how is one to orient production toward the meeting of the needs of consumers?

[Answer] One of the simplest solutions is to turn the consumers of products into clients, moreover, without middlemen in the person of trade and distributing organizations. The diagram of such a process could, for example, look as follows. The sector, which has been given the rights of a client and the corresponding resources, sends the program of the production of the equipment it needs to the USSR State Planning Committee. The aggregate of such programs also constitutes the basis of the state five-year plan of the production of machines and technological equipment and of the plan, which is formulated the clients themselves, and, of course, completely meets their needs.

[Question] It is not necessary to be an specialist to understand: the efficiency of the work on the retooling of our national economy in many respects is also governed by the efficiency of the financial mechanism. What problems of its improvement are most urgent today?

[Answer] First of all it is probably necessary to reorganize to some degree the very system of the formation and use of the sources, from which the development of science and technology is financed. Today the so-called unified fund for the development of science and technology is the basic one. It is created at the expense of the profit from the activity of production and scientific production associations and enterprises. Now it is deemed necessary to leave this profit or the bulk of it at their disposal. Such a step will enable enterprises and associations to carry out more vigorously the development and introduction of new equipment. Another matter--and it is necessary always to remember this--is large and complex jobs which are important for the sector as a whole. The source of their financing is that portion of the profit, which remains "in the hands" of this sector.

The very methodology of forming the unified fund for the development of science and technology also requires revision. For the present only the profit from production operations enters it. But the obtaining of the planned profit depends on a large number of factors. It often happens that the indicator of the profit due to a number of objective reasons is not fulfilled. Then the deductions for the unified fund for the development of science and technology also automatically decrease, just as automatically as the possibilities of ministries and the enterprises and associations themselves to finance promising jobs, which are vitally important for them, also decrease. Moreover, the instability of the profit as the main, sole source of the formation of the unified fund leaves "weak" enterprises without assets at all for renovation and retooling. But precisely this is in principle wrong, since we need to bring namely them up to the proper level of profitability by means of new equipment and advanced technologies.

Practical experience shows that the ratio of the expenditures on research and development, as well as on the assimilation of new products, which are financed from the unified fund, differs sharply in different sectors. This, of course, leads to certain "biases" in the development of scientific and technical progress. In order to avoid this, it would be wise, in my opinion, to establish the proportions between these two types of expenditures in the form of flexible standards of the division of the unified fund. For example, if the products of the given sector in their majority do not satisfy the

present requirements, the share of the expenditures on research and development should be increased.

In short, the implementation of the entire set of measures on the improvement of the economic mechanism, which are outlined by the decisions of the 27th CPSU Congress and only upon a portion of which I have touched, will contribute to the decisive acceleration of scientific and technical progress.

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ORGANIZATION, PLANNING AND COORDINATION

## SHKABARDNYA DETAILS PLANS FOR INSTRUMENT MAKING

Moscow ARGUMENTY I FAKTY in Russian No 22, 27 May-2 Jun 86 pp 4-5

[Interview with USSR Minister of Instrument Making, Automation Equipment, and Control Systems Doctor of Technical Sciences Mikhail Sergeyevich Shkabardnya by an ARGUMENTY I FAKTY correspondent under the rubric "Acceleration: What Has Been Done": "Instrument Making: The Means of Reorganization"; date, place, and occasion not given; first two paragraphs are ARGUMENTY I FAKTY introduction]

[Text] Microelectronics, computer technology and instrument making, and the entire information science industry are by right considered the catalyst of modern scientific and technical progress. They are having a decisive influence on the efficiency of means of labor in all the sectors of the national economy.

Our correspondent asked USSR Minister of Instrument Making, Automation Equipment, and Control Systems Doctor of Technical Sciences M.S. Shkabardnya to tell how the new tasks are being accomplished by enterprises and organizations of the sector during the current five-year plan.

Correspondent. Mikhail Sergeyevich, some mass media of the West assert that in the development of instrument making the Soviet Union has fallen far behind the leading capitalist states. I would like to find out your opinion on this score.

Shkabardnya. I consider such assertions unfounded. Now in the world there is not one country which has superiority in all the varied directions of modern measuring equipment and computer technology. Instrument making is a science-intensive sector and requires the availability of a sufficiently powerful potential. In our country such a potential exists. Moreover, precisely our socialist system and the planned system of the management of the economy make it possible to concentrate the resources of the country in the necessary proportions in the main directions of economic and technical development.

The support of the program of the study of Venus and Halley's Comet by the Vega interplanetary stations and their technical equipment are a splendid example of the high level of Soviet instrument making.

At the same time we are evaluating our work rather critically and are speaking about the shortcomings. And we are not afraid to do this. This probably gives the mass media of the West an excuse to speak about our ostensible lag.

Correspondent. What basic tasks face the sector during the 12th Five-Year Plan?

Shkabardnya. In order to imagine more visibly the scale of what has been outlined, I will speak about several results of the work of instrument makers during the past five-year plan. The assignment on the growth rate of labor productivity was fulfilled in 4 years. Labor productivity increased by 43.7 percent instead of the planned 33.6 percent, which enabled us by means of this to obtain practically the entire increase of the volumes of the output of commodity production.

The labor collectives of the sector produced in excess of the plan computer hardware, automation equipment, and spare parts for them in an amount which exceeds 500 million rubles. In the past 5 years about 2,000 obsolete types of equipment were removed from production, and at the same time we assimilated the production of more than 3,000 new items. I believe that these figures are sufficient to show that during the past five-year plan Soviet instrument making took a noticeable step forward in its progressive development.

However, such a growth rate of the sector still does not satisfy us. During the 12th Five-Year Plan a very difficult and responsible task has been set for instrument makers--to increase the volume of production of instruments, automation equipment, and computer hardware by 1.7-fold. Here the production of computer hardware should increase by at least twofold.

The most important aspect of our activity is the substantial increase of the reliability and quality of products. During the next 5 years we plan to update more than half of the items being produced. Here we advanced a mandatory condition--that all innovations would conform to the highest world level.

Correspondent. By what means do you plan to accomplish these plans?

Shkabardnya. First of all, by the retooling and complete automation of production, the extensive introduction of new microelectronic technology, and other measures. During the 12th Five-Year Plan more than 50 percent of the capital investments are being channeled into the retooling and renovation of operating enterprises, which, according to our calculations, will provide a 1.7-fold increase of labor productivity for the sector as a whole. This, in turn, will help to increase the planned production volume without the attraction of additional manpower.

Among the specific steps is the significant (more than fourfold) increase of the volume of our own production of special technological equipment. Automatic equipment, industrial robots, rotary lines, manipulators, robotized complexes, and computer hardware are finding more and more extensive use. Integrated computer-aided works will be developed precisely on this base. Strictly speaking, they are already being developed. For example, at the

Vtoroy Moskovskiy chasovoy zavod Production Association and the First Moscow Watch Plant. We recently discussed this question in the collegium of the ministry. And we are fully confident that the first computer-aided works in the sector will begin to operate already during the current five-year plan.

The main reserve of the constant updating of products is the extensive use of computer-aided design systems. Precisely they make it possible to speed up by many fold the process of developing new items and introducing them in production. During this five-year plan the volume of the development and use of such systems and subsystems will increase by more than threefold.

Today the instrument makers have developed several types of automated workplaces, which are the main component of the systems. Operating in the mode of interaction with man, they make it possible to make various engineering and design calculations, as well as to design the technological processes of the production of parts, accessories and tools, and control programs for machine tools.

We intend to achieve the necessary technical level of items mainly owing to the active use of microprocessor equipment. Laser equipment and fiber optics are receiving more and more extensive use. In particular, by the end of the 1980's we plan to increase by three- to fourfold the volume of the introduction of microprocessor equipment and microelectronic technology. This will make it possible not only to increase the reliability and quality, but also to expand the functional possibilities of instruments and to decrease the labor intensiveness in case of their production, the materials-output ratio, and the consumption of energy.

Correspondent. In the West, as is known, technical progress is leading to the increase of unemployment. But what will the social consequences of automation be for the Soviet people? How will the people, who have been released at the works, be placed?

Shkabardnya. Indeed, in the industrially developed capitalist states in the past 15 years along with the development of electronics and robotics unemployment has also increased rapidly. And now in the West many are predicting great successes in the development of new technologies by 2000, but no one is venturing to assert that in this case unemployment will decrease. On the contrary, its further increase is expected.

In socialist society matters are quite different. I will cite the example of our sector. The mechanization and automation of the manual operations on the production of thermometers at the Klin Termopribor Production Association made it possible to free 200 workers from "harmful" shops. Robots replaced them. The automation of production provided the enterprise with an economic impact of nearly 1.5 million rubles. The expenditures on the retraining of the freed workers came to a much smaller amount.

At the Vtoroy Moskovskiy chasovoy zavod Production Association four automatic lines and hundreds of manipulators were introduced, two shops and three sections were mechanized. This made it possible to free 923 people at these works. By means of the expansion of production the people were placed in

jobs: 318 production workers underwent retraining, 363 people acquired new occupations. Work was also found for the others. As a result of the introduction of new equipment and the automation and mechanization of production the material stimulation of the workers also improved. The average wage at the association increased by 6.9 percent.

Correspondent. At the 27th congress the reorganization of the management of the economy was spoken about. How does the structure of the management of the sector appear to you? What results do you expect from this?

Shkabardnya. Today it is already possible to speak about the first part of the question in the past tense. As of 1 January of this year our sector changed over from a three-level to a two-level system of management.

All our enterprises and scientific production and production associations are directly subordinate to the central staff of the ministry. Reorganization made it possible to increase the efficiency in the management of enterprises and associations and to realize feedback with them more specifically.

The first months of work in the new way confirmed the correctness of the calculations. In turn, the staff of the ministry obtained the opportunity to analyze more thoroughly the activity of production and scientific collectives, thereby identifying and putting into circulation additional reserves of material and manpower resources and the scientific production potential of the specific collective.

At the same time the structure of the organization of the basic unit--enterprises and associations--also underwent serious modernization. Their number was reduced. New production and scientific production associations, which now determine the character of the sector, were established by means of consolidation.

The goal of consolidation is obvious--the further concentration of production and the strengthening of its contact with science. All this in aggregate is leading to the significant shortening of the time of the development and introduction of new complex items. The experience of the Orel Prompribor Production Association, the Lithuanian Sigma Production Association, and other leading collectives of ours attests that the establishment of associations will help to shorten the time of the assimilation of new equipment to one-half to two-third.

Now we are engaging in the further perfection of the plan indicators, which are aimed at the development of the independence of enterprises and the further increase of production efficiency.

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ORGANIZATION, PLANNING AND COORDINATION

## FASTER INTRODUCTION OF VUZ DEVELOPMENTS NEEDED

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 8, 22 Apr-5 May 86 p 2

[Article by E. Antipenko, deputy chief of the Scientific Research Work Main Administration of the USSR Ministry of Higher and Secondary Specialized Education, under the rubric "The Potential of Science of the Higher Educational Institution": "Expedite Use"; first paragraph is NTR: PROBLEMY I RESHENIYA introduction]

[Text] It is time not to recommend, but to plan the introduction of developments of higher educational institutions, the author of the published article believes.

Today 14,000 scientific research jobs are being performed at higher educational institutions of the country. During the past five-year plan higher educational institutions participated in 162 of the 174 all-union scientific and technical programs. In just 4 years of the past five-year plan more than 64,000 developments of higher educational institutes were introduced in the national economy with a proportionate economic impact of 7.4 billion rubles. More than 300 developments of higher educational institutions annually become a part of the sectorial plans of the development and introduction of new equipment.

As practical experience has shown, the most effective form of the extensive introduction of developments of higher educational institutions is their direct inclusion in the state plans of economic and social developments. The dynamics here is as follows: in 1984, 28 developments were included in the state plans, in 1985--34, and in 1986--about 50. During the 12th Five-Year Plan the possibility exists to double this number.

Among our developments are such revolutionary technologies as smelting in a liquid bath (the Moscow Institute of Steel and Alloys) and a new type of rolling (Chelyabinsk Polytechnical Institute).

It should be emphasized that the potential of science of the higher educational institution is quite impressive. But the scale and pace of the advance of developments into practice are not satisfactory. Here are several examples.

The double-action screw press, which was developed at the Moscow Higher Technical School imeni E.N. Bauman, is intended for the production of precision parts of complex configuration. Due to the fact that the part being processed in the closed die experiences a double impact in one pass of the punch, it was possible to decrease the number of traditional operations. The advantages of such a press are indisputable: the consumption of metal is reduced by up to 40 percent, the labor intensiveness of subsequent machining is decreased by up to 30 percent, energy expenditures are reduced, the productivity of forge processing increases. The press has been certified for the highest quality category. This is unique equipment which does not have equals in world practice. Nevertheless, it was not possible to include the production of just four such presses in the 1985 state plan, although the national economic need for them is much greater.

The fate of the Gorizont automatic precision drill, which was developed at the Moscow Mining Institute, is similar. It makes it possible to standardize and intensify the drilling process, to reduce energy expenditures, and to monitor the condition of the bit at the stope. As well as to exclude the possibility of the occurrence of occupational diseases among workers and to reduce employment. In spite of the great need for such an instrument, it was never possible to organize its production at enterprises of the Ministry of Instrument Making, Automation Equipment, and Control Systems.

The insufficiently strong design and pilot industrial base of the higher school is decreasing the effectiveness of science of the higher educational institution. This difficulty is being overcome by the cooperation of higher educational institutions with enterprises and organizations of several sectorial ministries and departments.

We would consider it advisable to simplify substantially the procedure of examining the technical innovations which have been developed by higher educational institutions.

It seems that we could introduce research results more rapidly, if the sectorial departments and the Consolidated Science and Technology Department of the USSR State Planning Committee, in having all the information, would specify the places and extents of their practical use. In our opinion, this is completely consistent with the very principles of centralized planning. For the present higher educational institutions are forced to seek themselves enterprises which could prepare innovations for series production.

Our developments are coming up against another substantial obstacle. The instances, when the experts of sectorial institutes reject them due to narrow departmental interests, are well known. As an example it is possible to recall the "road of sorrows" of the analog computer complex, which was developed at the Moscow Engineering Physics Institute, or an entire range of machines, which use pulsed energy sources which were developed by the Kharkov Aviation Institute.

Unfortunately, the decisions of all the interdepartmental commissions, which consider all our suggestions on introduction, are of a recommendatory nature and they are not mandatory for the sectors.

Recently the USSR Ministry of the Machine Tool and Tool Building Industry appealed to us for assistance with a list of the scientific and technical problems which are urgent in the sector. We sent this list to the ministries of higher and secondary specialized education of the union republics. I am confident that in the immediate future the Ministry of the Machine Tool and Tool Building Industry will receive the suggestions it needs. If other sectors follow the example of the machine tool builders, our cooperation with them may become very fruitful.

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# PROBLEMS FACING SCIENCE OF HIGHER EDUCATIONAL INSTITUTIONS

Moscow EKONOMICHESKAYA GAZETA in Russian No 32, Aug 86 p 16

[Article by Corresponding Member of the USSR Academy of Sciences A.V. Kalyayev under the rubric "The Problems of Science of the Higher Educational Institution" (Taganrog): "The Right to Take Risks"; first paragraph is EKONOMICHESKAYA GAZETA introduction]

[Text] Positive experience, which is a good basis for the accomplishment of the tasks which were set for the higher school by the 27th party congress, has been gained at a number of higher educational institutions of the country.

It seems that now the fact that higher education should be organized on the basis of the close unification at higher educational institutions of the educational process and scientific research activity with the simultaneous interaction of higher educational institutions and industrial enterprises both in the area of the training of specialists and in the area of the development and introduction of new equipment and new technologies, does not arouse anyone's doubt.

It must be stated frankly that the planning of the training of specialists at higher educational institutions has come into sharp conflict with the actual needs of industry. This applies both to the number and to the range of graduates of higher educational institutions.

Everyone knows cases of the sharp decline of the prestige of engineering labor. The surplus of the training of engineers by technical higher educational institutions and the oversaturation of many enterprises with such personnel have led to the frequent use of specialists for the wrong purpose. It has become almost a rule to fill office positions with engineers, to form brigades of engineering and technical personnel for work at vegetable bases, to send engineers for the performance of the functions of handymen for the improvement and cleaning of cities and enterprises, and so forth. Moreover, such trends have begun to spread to scientific associates of scientific research institutes and to instructors and scientists of higher educational institutions.

And this is against the background of an overall shortage of manpower resources at industrial enterprises of the country! What is the reason for such a situation.

First of all the fact that the training of specialists at higher educational institutions is being carried out entirely at the expense of the state budget. Industrial ministries and enterprises at present, in essence, do not incur any expenses and, what is the main thing, do not have any duties in the training of engineers at the higher school. They are not only no responsible, but also do not pay for this! But they can order the training of specialists at higher educational institutions as they wish, moreover, without sufficient grounds.

The USSR State Planning Committee formulates in accordance with such orders assignments for the USSR Ministry of Higher and Secondary Specialized Education and the ministries of higher and secondary specialized education of the union republics. As a result from year to year an increase of the graduating class of specialists was planned, decisions on the establishment of newer and newer higher educational institutions were made. At the same time the resources for the development and strengthening of the educational and everyday material and technical base and for the establishment at higher educational institutions of a strong infrastructure of the scientific subdivisions increased significantly more slowly.

Now several higher educational institutions, especially newly established ones, have weak scientists and a backward and entirely inadequate material and technical base and are poorly furnished with modern instruments and equipment. And higher educational institutions quite rarely have a good experimental production base, without which the high-quality development of prototypes of the latest equipment, and especially its efficient and rapid introduction are impossible.

The Taganrog Institute of Radio Engineering imeni V.D. Kalmykov, at which I work, is not among such weak higher educational institutions. It belongs to the group of strong ones. A well-developed scientific research and experimental design infrastructure is at the disposal of the Taganrog Institute of Radio Engineering. But the above-noted difficulties and problems also have a close bearing on it.

Let us take the training of personnel. During the 12th Five-Year Plan the Taganrog Institute of Radio Engineering trained more than 5,000 engineers in specialties of the latest equipment, nearly 1,000 of whom were assigned to work at enterprises and organizations of Taganrog.

It is well known that the training of a specialist at a higher educational institution costs on the average 10,000 rubles, while in the latest specialties approaches 15,000-20,000 rubles. Thus, we have turned over to industry highly skilled personnel, the training of whom cost during the five-year plan approximately 100 million rubles. But what did the higher educational institution get from industry? Enterprises and ministries allocated to us during this period assets for the acquisition of equipment in the amount of only 4-5 percent of the indicated total.

The institute received very little assistance from the enterprises and organizations of its own city. All our requests to enterprises of Taganrog to help the institute in the settlement of questions of housing for the professors, instructors, and scientists of the institute, in the repair of dormitories and educational buildings, and in the allocation of the necessary equipment and machinery, as a rule, meet rejection and, what is very sad, find very weak and inefficient support in the city party committee and the city society executive committee.

The situation is also no better on the all-union scale. Our institute, for example, fulfilled during the 11th Five-Year Plan a major scientific comprehensive goal program for the Ministry of the Electronics Industry on the development and production of high-performance multiprocessor computer systems, which do not have analogs in the world, and new microprocessor complexes, which do not have analogs in the world. A number of large integrated circuits, which were developed by the institute jointly with enterprises, have been introduced in series production. The Taganrog Institute of Radio Engineering during the past five-year plan sent many of its pupils to enterprises of the electronics industry throughout the country.

In return the Ministry of the Electronics Industry turned over to the institute during the five-year plan advanced equipment worth 2-3 million rubles, for which we are, of course, grateful to it. But is this really adequate "payment" for the training of specialists, for scientific research, and for the development of microprocessors and computer systems, which do not have analogs in the world?

In the Ministry of the Electronics Industry they believe that they gave the institute too much. It must be assumed that out of ministerial munificence it turns over even less to other higher educational institutions.

It will be difficult to overcome the bias in the planning of the training of engineering personnel, if the situation, in case of which industrial ministries do not pay for the expenditures on each specialist, who has been trained for them at the higher educational institution, is preserved, until the higher educational institutions has the profit necessary for its further development.

It is necessary to place the training of specialists at higher educational institutions on a firm cost accounting basis. Industrial ministries and enterprises should not only completely reimburse higher educational institutions for the financial expenditures, ensuring the necessary minimum profit, but also allocate the corresponding share of limits for the construction of educational buildings, dormitories, and apartments, the corresponding funds for the acquisition of equipment and materials, as well as staff and wage funds for the development of scientific research and experimental design development and the formation of pilot production bases.

But how do things stand with the use of the results of research and development of higher educational institutions?

In recent years the situation has improved somewhat. Especially good results are being obtained in case of the fulfillment of the scientific and technical comprehensive goal programs of industrial ministries and the Ministry of Higher and Secondary Specialized Education, in which, as a rule, groups of higher educational institutions and enterprises are participating.

Many higher educational institutions, which are participants in comprehensive programs, are obtaining significant scientific results and are developing and introducing instruments and devices, which do not have analogs and lead foreign developments. And this is in case of financing not according to the item "science," but according to the item "education" with all the ensuing consequences--a lower wage than in industry, the lack of assets for materials and components, and so forth.

It is high time to eliminate this disproportion. Science, no matter what kind it is--academic science, science of the higher educational institution, or sectorial science--should be financed according to one item--"science." Only the end scientific and technical results and, of course, introduction and the efficiency of use in the national economy should serve here as the criteria. It is necessary at the same time to strengthen the stimuli for industrial enterprises in case of the settlement of questions of the use of the results of the scientific and design developments of higher educational institutions.

Some ministries believe that, until something similar has been developed abroad, one should not undertake the extensive introduction of domestic developments of higher educational institutions. Especially as even the most promising scientific development, as a rule, without additional labor and sufficiently broad advertisement does not always find a user immediately. In these cases enterprises and ministries, instead of bringing the innovation jointly with the developing higher educational institution up to consumer condition and carrying out extensive advertising for the purpose of creating a sales market, prefer to take a simpler route.

They tell the higher educational institution that, until it secures extensive orders on the part of consumers, the introduction into production of even the best development is inadvisable. But in this way it is possible to bury a most promising achievement.

At the same time the unsound practice of constantly copying foreign models, while simultaneously ignoring domestic achievements, has become nearly customary. This has especially appeared in recent years in computer technology and microelectronics.

We have developments of higher educational institutions, which in a number of cases lead foreign results. For example, back in 1982 a fundamentally new microprocessor, which in contrast to all existing ones executes not elementary commands, but macro-operations, was developed at the Taganrog Institute of Radio Engineering. The microprocessor was put into series production. The institute significantly advanced the research in this direction and developed more advanced processors of this type, of which there are no equals in the world.

Suddenly in 1984 a foreign firm produced transputers which in their potentials are far inferior to the mentioned domestic developments. However, some managers, on whom the advancement into production of domestic microprocessors, which are oriented toward the hardware execution of macro-operations, depends, are beginning to say that it is still unknown to what our results will lead and, therefore, it is advisable to copy foreign "transputers." Such imitation leads to constant lagging behind foreign results, and it is inadmissible to tolerate this.

It is possible to ensure a burst ahead on the world arena in modern equipment only in case of the use of advanced domestic scientific achievements. But for this it is necessary to agree to certain initial expenses and even to the taking of risks, which will pay for themselves with interest, if only half of the innovations are used.

If a "saving" on innovations is not accomplished, as has been done so far, the harm for the national economy of the country will be enormous. In order to avoid it, ministries and departments must use more actively the developments of higher educational institutions and introduce them in production, especially in the fields of computer technology, microelectronics, computer-aided design systems, robotics, flexible systems, and instrument making.

I would like to direct attention to another thing in the interrelations of higher educational institutions with industry. In order to introduce a complex computer system or a complex instrument, it is necessary not only to conduct research and development, but also to draw up a complete set of design documents, as well as to produce a production prototype and to carry out its adjustment and tests. The higher educational institution is not capable of such work. Some enterprises understand this and are taking it upon themselves.

More often a different thing is encountered. The client gives the higher educational institution only money and expects that the latter will perform everything from start to finish, and does not agree to help the higher educational institution in the drawing up of the design documents and the production of complex prototypes. And what of it? The theme is not introduced, even if the development of the higher educational institution is very efficient.

So that this would not happen in case of the development by higher educational institutions of complex systems and instruments, industrial ministries could attach to higher educational institutions design bureaus for the production of the necessary design documents and industrial enterprises for the production of prototypes.

The pilot production base of the Taganrog Institute of Radio Engineering has been under construction for 3 years now. In this time only 900,000 rubles of the 6 million rubles of the total amount of construction and installation work have been assimilated. It is easy to calculate that two five-year plans will also not be enough for the completion of construction!

Unfortunately, not only the construction workers, but also executives of the city and oblast have a cool attitude toward this project. For it is not in the lists of the most important ones and is not being monitoring by anyone, except the RSFSR Ministry of Higher and Secondary Specialized Education, which, unfortunately, is allocating from its meager resources only 500,000 rubles a year for its construction.

One must also not let the problem of attaching scientists take its own course. Now at the institute many doctors and tens of candidates of sciences urgently need housing. But no one is allocating to the institute assets for the construction of an apartment building--neither the Ministry of Higher and Secondary Specialized Education nor the industrial ministries, for which the institute is working. The city soviet executive committee is also giving practically nothing. As a result during the 11th Five-Year Plan nearly 60 candidates of sciences got their release from the institute in connection with the lack of housing. But these are our basic scientific personnel, whom we have trained for 10-15 years each.

The problem of housing for scientists of higher educational institutions must be solved at the state level. Industrial ministries could turn over to higher educational institutions in a planned manner the limits and assets, which are necessary for this purpose, while the local soviets could regularly allocate apartments from the city funds. And these questions must be placed on a firm legal basis.

At the same time it is also necessary to solve the problem of daily student life. It is impossible to tolerate the fact that at several higher educational institutions nearly half of the students, who need dormitories, wander about private apartments. The Ministry of Higher and Secondary Specialized Education should receive the necessary allocations for these purposes. This is especially necessary now, when the task of sharply increasing the quality of the training of specialists is being posed.

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## MEMBRANES INTERBRANCH SCIENTIFIC TECHNICAL COMPLEX

Moscow IZVESTIYA in Russian 7 Jul 86 p 2

[Interview with Candidate of Chemical Sciences Vladimir Pavlovich Dubyaga, deputy general director of the Polimersintez Scientific Production Association for the Membranes Interbranch Scientific Technical Complex, by IZVESTIYA correspondent A. Yershov under the rubric "The Key Task Is Introduction" (Vladimir): "Membranes Await Clients"; date, place, and occasion not given; first paragraph is IZVESTIYA introduction]

[Text] At the 27th CPSU Congress it was deemed necessary to ensure the extensive introduction in the national economy of fundamentally new technologies, including membrane technologies. The Membranes Interbranch Scientific Technical Complex was recently established in Vladimir. Candidate of Chemical Sciences V. Dubyaga, deputy general director of the Polimersintez Scientific Production Association for the interbranch scientific technical complex, tells about the formation of the complex and its first practical steps.

[Question] Vladimir Pavlovich, what are membranes and the technologies based on them?

[Answer] Science here has adopted an idea from living nature. In all organisms the most important processes of metabolism occur with the aid of biological membranes. Classical examples of this are the functioning of the kidneys and liver. Membrane technology is based on the remarkable property of semipermeable polymer films to let some substances pass through and to block others. In equipment membranes are used for the separation and purification of liquids and gases. Today's membranes are the finest "sieves," which make it possible to separate substances at the molecular level. The peculiarity of membrane technologies consists in the extremely low energy expenditures as compared with other methods. For example, for the desalinization of a liter of sea water by the conventional method it is necessary to consume 539 kilocalories of heat. In case of membrane technology one-fifteenth to one-tenth as much is needed.

Membranes are being used in biology and medicine for the extraction and purification of biologically active substances, vaccines, and enzymes and in the food industry for the concentration of fruit and vegetable juices, milk,

and dairy products and the obtaining of high-quality sugar. The use of semipermeable membranes affords extensive opportunities for the development of fundamentally new, simple, energy-saving technologies. It is of no small importance that from the ecological standpoint such membranes are very effective, since they make it possible to recover various waste products.

But until recently membrane methods for a number of reasons did not receive extensive application, here we are lagging seriously behind foreign practice.

[Question] Is this, apparently, one of the reasons for the establishment of the Membranes Interbranch Scientific Technical Complex? What belongs to it?

[Answer] At the All-Union Scientific Research Institute of Synthetic Resins the problems of membranes were at first dealt with by small forces, but subsequently a special department made up of five laboratories was established. Now our institute is the main one for this problem. So that the establishment of the Membranes Interbranch Scientific Technical Complex began not in a void.

Of course, other scientific institutions also dealt with membrane technologies. But this work was performed in isolation, and hence the low efficiency of the developments. With the establishment of the Membranes Interbranch Scientific Technical Complex a unified, interested manager, which unites the efforts of many scientists, designers, and production workers, appeared for the new direction. Scientific institutes, planning and design bureaus, experimental bases, and problem laboratories of the Ministry of Chemical and Petroleum Machine Building, the Ministry of Light Industry, the Ministry of Higher and Secondary Specialized Education, and other departments are being enlisted in the work of the complex.

[Question] Please dwell on this feature in greater detail.

[Answer] Within our interbranch scientific technical complex the problem of the creation of new membranes and the development and introduction in the national economy of automated separators will be solved comprehensively. It is proposed to organize the interrelations of all the members of the interbranch scientific technical complex on a strictly cost accounting basis. In other words, our complex is a kind of firm, which performs the entire series of research, design, and introduction operations and turns the innovation over to the client "turnkey."

We already have a scientific reserve. Membranes, which are not sensitive to corrosive media--acids and alkalis--have been developed. They are made on a special base, which increases their durability. Recently a plant for the production of such membranes on a commercial scale was put into operation in Kazan, at the Tasma Association. And we are working on the development of multilayer membranes. We are striving to develop membranes which in their properties approximate natural membranes. For example, in a living organism membranes easily separate potassium and sodium ions, but science so far cannot do this. In short, we have a large number of problems.

The most important task is to deal persistently and consistently with the introduction of the scientific reserve, which has already been accumulated, and to ensure its large-scale nature. A pilot-scale plant, which makes it possible to extract valuable nutrient protein from cottage cheese whey, was tested at the Vladimir Dairy Combine. A new shop, where along with nutrient protein it is planned to obtain from this raw material milk sugar--lactose--was recently built. If the cost of a ton of whey comes to about 3 rubles, from each ton of it they obtain valuable products worth approximately 10 rubles. In the new shop the installation of a computer, which will control all the processes, is being completed.

However, here is what is disturbing. In Vladimir Oblast alone there are many dairy plants, at which this innovation should be used. Such a situation, when innovations are used in the national economy only in a singular number, cannot satisfy us. One should boldly "duplicate" them, striving for the maximum impact. A situation, in which we should as if advertise, suggest various innovations which are connected with membrane technology, has now formed. For example, a mobile plant for removing oils and other impurities from cleansing solutions, has been developed here. It is already in operation in Vladimir at one of the enterprises. This matter is very profitable and useful, the saving amounts annually to more than 40,000 rubles. But, alas, other clients for similar plants for the present are not visible.

[Question] With what difficulties were you faced in the process of organizing the interbranch scientific technical complex?

[Answer] It is a question of difficulties mainly of an organizational nature. Back in the middle of last year an order on the establishment in Vladimir of the Polimersintez Scientific Production Association, in which our institute was also included, was issued in the USSR Ministry of the Chemical Industry. But to sign an order does not yet mean to complete the job. The formation of the new scientific production association was dragged out unjustifiably through the fault of the ministry. Of course, this also affected the formation of the interbranch scientific technical complex, which should operate on the basis of the association. Unified coordinated plans of scientific research work within the interbranch scientific technical complex were recently approved. However, other questions remain "open." Thus, we have a rather good experimental base, but do not have a works to produce automated separators for various sectors. The final unit--machine building--does not exist in the "science--practice" cycle. Recently we formulated suggestions on the establishment of such a base. During the construction of the pilot production subdivision of the institute we are providing for a special machine shop. Without this we will not be able to "duplicate" innovations. Moreover, an educational center is needed in order to train personnel for the operation of the separators for numerous clients. This will make it possible to put the units in reliable, trained hands. It is necessary to approve more quickly the model statute on the interbranch scientific technical complex. Unfortunately, the lack of this document is seriously holding the matter back.

During the past five-year plan the economic impact from the use of membrane technologies in the national economy came to about 27 million rubles. We are

incorporating in the plans for the new five-year plan the increase of this impact to 800 million rubles. The close union of science and production within the interbranch scientific technical complex will contribute to the rapid acceleration of scientific and technical progress in this priority direction.

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CSO: 1814/247

## PROTECTION OF RIGHTS OF INVENTORS, EFFICIENCY EXPERTS

Moscow CHELOVEK I ZAKON in Russian No 5, May 86 pp 63-69

[Article by L. Abeldyayev, deputy chief of the Court Organs Administration of the RSFSR Ministry of Justice, and Candidate of Juridical Sciences I. Grishin under the rubric "The Legal University": "Inventor--It Sounds Proud!"; capitalized passages published in boldface]

[Text] The occupation of automobile tire assembler requires large physical loads and, as a rule, strong male hands. The innovators of the Moscow Tire Plant thought a long time about how to facilitate their labor. The workers of the plant and scientists of the Scientific Research Institute of the Tire Industry developed and successfully introduced in production a flow line for the assembly of radial tires.

This invention does not have analogs in domestic and foreign practice. It made it possible to decrease significantly the labor intensiveness of the process, to increase labor productivity, to stabilize the quality of items, and to decrease the power-output ratio. The economic impact in 1 year alone came to 513,000 rubles. Labor productivity increased by ninefold and made it possible in each section to free from difficult physical labor 20 assemblers, whom it is now possible to use in other operations. Here is what the introduction of just one innovation yielded.

In the new version of the CPSU Program, which was adopted by the 27th party congress, it is especially emphasized that the party will henceforth show tireless concern for the utmost increase of the prestige of honest, highly productive labor, the development of initiative and creativity in work, and the further strengthening of the principles of a communist attitude toward labor. The party requires that in every labor collective an atmosphere of respect for innovators and leaders of production would be firmly established every day.

An important role in the successful fulfillment of the historic plans of the party belongs to the army of many millions of leaders and innovators of production, of which efficiency experts and inventors are a part. In our country about 5 million efficiency proposals and applications for inventions are submitted on the average in a year and more than 23,000 inventions and 4 million efficiency proposals are introduced in production annually. In 1984

alone the economic impact from their use came to 7 billion rubles. Here is what kind of force this is!

Of course, new equipment is better than old equipment, but it is necessary already now, without waiting for retooling, to rely on people with their innovative thinking, creative approach to work, and search for new, more advanced modes and methods of production. But for the present conservatism and the reluctance of some organizers of production and executives of trade union committees to take a practical look at the essence of useful proposals and to support innovators are interfering.

The proprietary rights of inventors and efficiency experts, which are connected with the payment to them of the author's award, are being violated. The check of the State Committee for Inventions and Discoveries of the USSR Council of Ministers and the Central Council of the All-Union Society of Inventors and Efficiency Experts in 1984 of a number of enterprises of the Ministry of Machine Building for Light and Food Industry and Household Appliances showed that the ministry was chronically in debt to the authors of the used inventions. At a number of enterprises they had settled accounts with only 10 percent of the authors of innovations and inventions. While during the period of 1981-1982 for the enterprises of the ministry the award has not been paid for nearly 500 inventions which had been used for the first time.

What is to be done to avoid such violations?

First of all one has to apply in good time and correctly the legislation which is aimed at the protection of the violated or disputed rights or the interests of the authors, which are protected by law.

The USSR Constitution proclaims: the rights of inventors and efficiency experts are protected by the state. In development of this the Fundamentals of Civil Legislation of the USSR and the Union Republics, as well as the civil codes of all the union republics establish the procedure of the exercise and protection of the rights of authors of inventions and efficiency proposals.

An active role in the development of the broad and mass movement of innovators and in the protection of their personal and proprietary rights belongs to trade unions, various scientific and technical societies, and the All-Union Society of Inventors and Efficiency Experts (VOIR).

The State Committee for Inventions and Discoveries of the USSR Council of Ministers (Goskomizobreteniy SSSR) is the main state organ which organizes and directs the work of inventors and efficiency experts in the country. Within the limits of its competence it issues various instructions and explanations, which have the force of sublegal acts which are mandatory for execution by executives of enterprises, institutions, organizations, ministries, and departments, as well as by inventors and efficiency experts.

At the same time the contemporary Soviet worker and employee should themselves know well their rights and duties in this area. Let us tell about them.

Precisely what is recognized as an invention?

THE TECHNICAL SOLUTION OF A PROBLEM IN ANY AREA OF THE NATIONAL ECONOMY, SOCIOCULTURAL CONSTRUCTION, OR THE DEFENSE OF THE COUNTRY, WHICH IS NEW, HAS SUBSTANTIAL DISTINCTIONS, AND YIELDS A POSITIVE IMPACT, IS CALLED AN INVENTION. This means that something substantially new, which was previously unknown to anyone either in the Soviet Union or abroad, as compared with the already known solutions was developed in the field of science and technology. For example, a new device, method, substance, the use of previously known devices, methods, and substances for a new purpose, as well as new strains of microorganisms are recognized as inventions. Moreover, the development of new strains and hybrids of agricultural crops and other cultivated plants, a new breed of agricultural animals and poultry, new breeds of the mulberry silkworm, and others is equated with inventions.

However, methods and systems of the organization and management of the economy, in particular, are not recognized as inventions. For example, planning, financing, supply, accounting, and so forth. The designs and diagrams of the planning of structures, buildings, and territories, for example, population centers, agricultural lands, and parks, are also not regarded as such. Solutions, which are in conflict with public interests, the principles of humaneness, and socialist morals or are obviously useless, also cannot be recognized as inventions.

WHO CAN BE AN INVENTOR?

Any citizen, scientific research institutions, and various socialist enterprises and organizations, which use inventions, as well as the Soviet state can be him. If an invention has been developed by the joint creative labor of two or more citizens, it belongs to them jointly as coauthors. However, it should be borne in mind that according to the law people, who gave the innovator only technical assistance, for example, prepared drawings, photographs, mockups, and prototypes, made calculations, drew up documents, conducted a pilot check, and so forth, are not recognized as coauthors.

The officials, who merely supervised the themes being elaborated, but did not take a creative part in their development, also cannot be considered coauthors. Let us explain this with an example from legal practice.

Ponomarev submitted an application for the invention "The Towing of All Vehicles." Having learned of this, individual officials of one of the Krasnodar interrayon production associations demanded that the inventor include them in the application as coauthors. Using their official position, they began to create obstacles for the speeding up of the recognition of the invention and its subsequent introduction in the national economy. Ponomarev was forced to enter their names in the application. After obtaining the inventor's certificate he appealed to the court. After examining the materials of the case, the court came to the conclusion that the indicated people had not taken any creative part in the development of the invention, but had forced the inventor to include them among the coauthors.

Instances when several people lay claim to the same invention, that is, a dispute over authorship arises, are frequently encountered in life. It can be aimed both at the identification of the real author and at the protection of his rights against their usurpation by other people. Here is an example. Krutolobov addressed to the court a statement of claim against Izvekov concerning his recognition also as an author of the invention. Having studied the submitted evidence, the court rejected Krutolobov's suit on the basis that he had not taken a creative part in the development of the invention, but had merely given Izvekov assistance in drawing up the application for the invention.

Depending on the desire of the author of an invention an inventor's certificate or patent can be issued to him in his name. In case of coauthorship these documents are issued to each of them with the indication of the names of the other coauthors.

What are these documents?

AN INVENTOR'S CERTIFICATE IS A PERMANENT DOCUMENT WHICH CERTIFIES THE RECOGNITION OF THE PROPOSAL AS AN INVENTION, THE PRIORITY, THAT IS, THE PRECEDENCE OF THE INVENTION, THE AUTHORSHIP OF THE INVENTION, AND THE EXCLUSIVE RIGHT OF THE STATE TO THE INVENTION. By the exclusive right of the state to an invention, which is valid for 15 years, there is understood the fact that during this period no one has the right without the consent of the state to use or dispose of the invention.

It should be noted that inventions are used by Soviet state, cooperative, and public enterprises, institutions, and organizations on the basis of the interests of the state and their own interests without special permission for this.

A PATENT IS A DOCUMENT WHICH ATTESTS THAT THE STATE RECOGNIZES THE EXCLUSIVE RIGHT OF ITS HOLDER TO THE INVENTION. It is issued in the name of the author or his successor with the mandatory indication of the surname, name, and patronymic of the author. The term of its effect is 15 years from the day of submission of the application. During this time no one can use the invention without the consent of the patent holder. However, he has the right to issue for a fee or free of charge a permit (license) for the use of the invention or to cede the patent entirely. In this case the contract or other document on the issuing of a license or on the cession of the patent should be registered with the USSR State Committee for Inventions and Discoveries. The failure to fulfill this requirement entails the invalidity of these actions.

A valid patent can be exchanged by the USSR State Committee for Inventions and Discoveries for an inventor's certificate in accordance with the petition of the author, who is the patent holder, or in accordance with the joint petition of the author and the patent holder.

The application for the issuing of the indicated documents is submitted directly by the author of the invention, his representative, or heirs to the USSR State Committee for Inventions and Discoveries. If the invention was developed in connection with the fulfillment of an official assignment, the

application is drawn up with the participation of the author and is submitted by the enterprise, institution, or organization within a month from the day of the appearance of the technical solution. However, it may also happen that for some reasons they did not submit an application. What is one to do then? If similar circumstances arise, the author has the right to do this independently. Here he should indicate that the invention was developed by him in connection with the fulfillment of an official assignment.

The application can be submitted by the author through the local organization of the All-Union Society of Inventors and Efficiency Experts.

In all instances it is submitted in three copies and should contain the following documents: the application on the issuing of an inventor's certificate or patent; a description of the invention with the formula of the invention; drawings; diagrams; the test report and other materials, which illustrate the proposed invention.

Within a 15-day period from the moment of its receipt the USSR State Committee for Inventions and Discoveries makes a preliminary check (study) of the observance of the demands which are made on the application. On the basis of the drawn conclusion the applicant is notified of the acceptance of the application for consideration or its rejection, or the author is invited to make the necessary changes and additions to it, for which a period of 2 months is granted. If he does not confine himself to it, the application is recognized as not having been submitted.

Having accepted an application for consideration, the USSR State Committee for Inventions and Discoveries within a 6-month period from the day of its receipt makes a check of the observance of the demands which are made on an invention, that is, organizes a state scientific and technical examination. In accordance with its results a decision is made on the issuing of or on the refusal to issue an inventor's certificate or patent. If the author does not agree with the decision, he can within a 2-month period submit a justified protest to the USSR State Committee for Inventions and Discoveries.

Having made the decision on the issuing of an inventor's certificate or patent, the USSR State Committee for Inventions and Discoveries enters the invention in the USSR State Register of Inventions and advertises this in its official bulletin. However, for the purposes of safeguarding state interests it can postpone advertisement or not advertise at all.

Thus, we have briefly examined the questions which concern invention. But what is efficiency promotion and who can be recognized as an efficiency expert?

At first let us explain what kind of proposal is recognized as an EFFICIENCY PROPOSAL. A TECHNICAL SOLUTION, WHICH IS NEW AND USEFUL FOR THE ENTERPRISE, ORGANIZATION, OR INSTITUTION, TO WHICH IT WAS GIVEN, AND ENVISAGES A CHANGE OF THE DESIGNS OF ITEMS, THE PRODUCTION TECHNOLOGY, OR THE USED EQUIPMENT OR A CHANGE OF THE COMPOSITION OF A MATERIAL, IS CONSIDERED IT.

In contrast to an invention, which creates something new, an efficiency proposal is of a local, regional nature. This means that it can be used at a specific enterprise, institution, or organization or at several organizations of a ministry or department.

Let us cite an example. In the city of Riga the lathe operator Paredis submitted a proposal on the preliminary heat treatment of an item before its production on a lathe. Not only was the product quality improved by this, but one of the subsequent operations in its production was also eliminated. The proposal was recognized as an efficiency proposal, since it was new for the given enterprise.

The proposals (besides the inventions) of engineering and technical personnel of scientific research, planning, design, and technological organizations and similar subdivisions of enterprises, which are grouped with the plans, designs, and technological processes that are being developed by these workers, are not recognized as efficiency proposals. Such proposals, the use of which can lead to the decrease of the reliability, durability, and other indicators of the quality of a product, cannot be considered efficiency proposals.

But who can be an efficiency expert and how is the efficiency proposal to be drawn up?

ANY CITIZEN OR SEVERAL CITIZENS, BY WHOSE CREATIVE LABOR THE EFFICIENCY PROPOSAL WAS DEVELOPED, CAN BE AN EFFICIENCY EXPERT. The author or coauthors submit a written application with a description of the essence of the proposal. In necessary instances drawings, diagrams, and sketches are attached to the application. It is submitted to the enterprise, institution, or organization, to the activity of which the proposal applies. Moreover, it is not important whether or not the author works at this enterprise.

If the proposal can be applied at various enterprises, institutions, and organizations, it is submitted to the ministry or department, under the jurisdiction of which these organizations are. An accepted application is liable to mandatory registration.

The consideration and the making of a decision on an application should be carried out within 15 days, and in a ministry or department within 1.5 months, from the day of receipt. Within this time the author is notified either of the recognition of the proposal as an efficiency proposal and its acceptance for use, of the conducting of the pilot checking of the proposal, or of its rejection with the indication of the reasons.

When a proposal has been accepted, a certificate is issued to the author. In case of coauthorship it is issued to each of them with the indication of the other authors.

Attaching great importance to invention and efficiency promotion in the country, the legislator envisaged for them a large number of personal nonproprietary and proprietary rights.

The right of authorship, the conferment on the invention of one's own name or a special name, participation in the performance of work on its introduction, and the recording in the labor book of the information on inventions and efficiency proposals, preferences to permits for creative business trips, and others are among the personal NONPROPRIETARY RIGHTS.

THE RIGHT TO THE AUTHOR'S AWARD IS THE MOST IMPORTANT PROPRIETARY RIGHT. It is calculated on the basis of the certificate of acceptance of the invention or efficiency proposal and depends on the saving, the positive impact, or the importance of the invention or on the type of use of the invention and the extent of application of the proposal. If the invention was a result of an official assignment (for example, in accordance with the plan of scientific research work and the introduction of new equipment) or was developed at organizations, which operate as a voluntary service, a one-time incentive award in the amount of 20-200 rubles per invention is paid to the authors, but not more than 50 rubles per person.

For inventions and efficiency proposals, the introduction of which does not yield a saving, but creates another positive impact, the one-time award is determined with allowance made for their value and is established by the manager of the enterprise, institution, or organization, at which they were introduced.

In addition to the material award, extensive MEASURES OF MORAL STIMULATION are envisaged for innovators. Thus, the honorary title "Honored Inventor of the Republic" and "Honored Efficiency Expert of the Republic" can be conferred on them.

IN CASE OF THE VIOLATION OF THE RIGHTS OF INVENTORS AND EFFICIENCY EXPERTS THEIR DEFENSE IS CARRIED OUT IN ADMINISTRATIVE AND LEGAL FORM.

Disputes: on the authorship (coauthorship) of an invention or efficiency proposal; on the priority of an efficiency proposal in case of the disagreement of one of the parties with the decision on this question, which was made in accordance with the complaint by the executive of an enterprise, institution, organization, ministry, or department, are resolved in legal form.

Here is one of the examples. The People's Court of the city of Belgorod-Dnestrovskiy of Odessa Oblast satisfied the claim of A. and K. about coauthorship of an efficiency proposal and against I. on his exclusion from among the coauthors. During the hearing the court established that A. and K. had formulated and submitted a proposal on the creation of an attachment for the machining on a standard-unit machine tool of two parts. At the same time I. had not taken any part in the development of this proposal. Having taken advantage of A.'s firing, he withdrew the application for the efficiency proposal, which had been submitted by her and K., and submitted a new application in his own and K.'s name. The court satisfied the claim and eliminated I. from among the coauthors. Disputes on the exaction of the award for an invention or efficiency proposal and others are also considered in legal form.

Here is another example from legal practice. Inventor D. submitted to the USSR State Committee for Inventions and Discoveries an application for an invention proposed by him. After consideration of the application he received an inventor's certificate. Subsequently his invention was used in the USSR Ministry of Power and Electrification, to which he also addressed a request on the issuing of the author's award. However, the chief engineer of the Production Engineering Main Administration refused to settle the question of the payment of the award and demanded of the author additional documents, which are necessary for the settlement, in his opinion, of this question. Then D. was forced to address a claim to the court, which also satisfied his legal demands.

The violation of the legal rights of the authors of inventions and efficiency proposals can also entail criminal liability. Thus, Part 2 of Article 141 of the RSFSR Criminal Code and the corresponding articles of the criminal codes of the other union republics establish that those guilty of announcing an invention prior to application without the consent of the inventor or of usurping the authorship of an invention or those who have compelled coauthorship of an invention, just as those who have usurped the authorship of an efficiency proposal, are punished by corrective labor for a term of up to 2 years or a fine of up to 300 rubles.



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## LIMITATION OF INFORMATION ON INVENTIONS SUGGESTED

Moscow IZOBRETATEL I RATSIONALIZATOR in Russian No 6, Jun 86 p 5

[Article by patent expert I. Krylov under the rubric "Problems": "Patent or Publish?"; first paragraph is IZOBRETATEL I RATSIONALIZATOR introduction]

[Text] Our state is suffering enormous losses, moral and material, just because the majority of descriptions of inventions contain information which it is also possible to use without the purchase of a license. The author believes that all the information, which constitutes "know-how," should be formed into a special section which is not to be published.

I will begin in a roundabout way. In 1826 P. Burnashev, director of the Department of Textile Mills of the Ministry of Finance, drew up a draft of the second patent law of Russia. After lengthy discussion the draft was the basis for the Statute on Licenses, which was approved by the State Council on 22 November 1833. The second section of the patent law--"On the Procedure of the Issuing of Licenses"--stated: "A person wishing to receive a license for an invention should submit its description with all its essential details, the techniques and manner of use of the invention, and the sketches and drawings pertinent to this, without hiding anything. In this description, just as in the sketches, the applicant should observe the greatest completeness, precision, and clarity, without the least ambiguity or misunderstanding; so that subsequently people could in accordance with just the description and sketches produce the designated item in reality, without having the need to resort to conjectures or to make up the shortcomings which are contained in it."

What a concise formulation of the demands on application documents! In this way one of the basic demands on the application for an invention--to reveal the essence of the invention so completely and precisely, that this would be sufficient for its practical implementation--was included in domestic invention law. In more or less similar formulations this demand is contained in the patent laws of the majority of countries of the world. The complete revelation of an invention in its description for the patent system of capitalism became a kind of "compensation," which ensures the transfer of new scientific and technical knowledge in exchange for the granting to the patent holder of the exclusive right to its temporary use. The failure of the

applicant to fulfill this demand entails rejections and inquires of the expert commission, as well as is the basis for recognizing a patent to be null and void.

Nevertheless in capitalist patent practice the degree of completeness of the revelation of an invention is a kind of "rope," which the applicant pulls toward himself and the expert commission pulls toward itself. When applying for a patent, the firm strives to leave outside the description of the invention the optimum ratios, dimensions, components, operating conditions, and so forth. In short, that without which either it is impossible in practice to implement the invention or, what is encountered much more often, it is impossible to derive the maximum positive impact of the invention. All these secrets of production--"know-how"--subsequently will become for the firm a source of profit from the sale of unpatented licenses. Incidentally, this is characteristic of not only patent, but also scientific and technical information as a whole. Under the conditions of the intensification of the competitive struggle information is turning more and more into the most expensive commodity, of which even money often cannot serve as an equivalent of equal value. Then information is sold for information, an patent is exchanged for a patent. The information iceberg in this case grows on the submerged side, only a negligible portion of the information of small value comes to the surface.

What conclusions follow from this? First of all, since it is also possible to read beyond our state borders the descriptions of inventions for USSR inventor's certificates, the more detailed revelation in them of the essence of the invention than in the descriptions of inventions for patents of foreign firms is hardly appropriate. To what is the aspiration of the applicant to present the invention with "the greatest completeness," which migrated from the Russian patent law of a century and a half ago to the 1973 Statute, the standard documents of the USSR State Committee for Inventions and Discoveries, and the instructions of the All-Union Scientific Research Institute of State Patent Expertise, leading? To the fact that the majority of descriptions of Soviet inventions contain quite sufficient information so that any capitalist firm could freely implement these inventions in metal without any purchases of licenses for "know-how." The publication of production secrets is destroying Soviet trade in licenses. As is known, only 8 percent of the Soviet inventions patented abroad are the basis for license agreements. The remaining Soviet patents consume foreign currency in vain--who will pay for information which has already been obtained free of charge?

So who needs "the greatest completeness" in the descriptions of inventions for inventor's certificates? The expert commission of the All-Union Scientific Research Institute of State Patent Expertise? It is undoubtedly needed, but the observance of this demand in the application materials is sufficient for the expert commission. I believe that in those instances, when an application for an official invention contains information which can constitute an item of "know-how," it should be formed into a special section which is not liable to further publication. This is especially important for inventions which are planned for foreign patenting.

I believe that this suggestion is in no way at variance with the principles of Soviet invention law. The inventor, in turning over to the state the exclusive right to the use of the invention, at the same time in conformity with Lenin's principle of the monopoly of foreign trade is also turning over the right to the commercial sale abroad of the item of "know-how," which was not revealed in the description of the invention.

A procedure, which is specified by the Model Contract on the Transfer of Scientific and Technical Achievements and the Provision of Assistance in the Use of Advanced Know-How, which was approved in 1971 by the State Committee for Science and Technology, exists for the free exchange of information on "know-how" within the country.

I believe that the difficulties, which can arise in the way of the implementation of this suggestion, are incomparable to the benefit which foreign trade and the economy as a whole will derive.



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BRIEF

INSTRUMENTS DEVELOPED BY STUDENTS--The student experimental laboratory (STELA) is working actively at the Leningrad Institute of Aviation Instrument Making (LIAP). More than 70 unique instruments, which are operating in various cities of the country, were developed at it. The students of the Leningrad Institute of Aviation Instrument Making have strong contacts with the 1st Medical Institute, the Institute of Physical Culture, the Institute of Physiology imeni I.P. Pavlov of the USSR Academy of Sciences, and the All-Union Cardiology Center of the USSR Academy of Medical Sciences. The instruments developed by students are helping physicians to treat people, biologists to organize experiments, and athletes to achieve new records. For example, the Trener-2 device determines instantaneously and accurately the pulse of an athlete. The VARIO-K instrument quickly identifies the predisposition of a patent to irregularities of heart activity. In the photo [photo not reproduced]: the young inventors demonstrate the Trener-2 instrument, which was developed by them. [Text] [Moscow NTR: PROBLEMY I RESHENIYA in Russian No 10, 20 May-2 Jun 86 p 6] 7807

CSO: 1814/248

## BRIEFS

STRIP ROLLING-DRAWING METHOD--The "rolling-drawing" (PV) process of producing cold-rolled strip has been developed at Chelyabinsk Polytechnical Institute. It is implemented on any of the cold-rolling mills of metals and alloys over the entire range of standards of thickness and width, which have been accepted today. The rolling-drawing process can be used effectively for the mechanical destruction of scale, including on continuous picklers. In all 360 inventor's certificates and 93 patents in industrially developed countries have been obtained for the rolling-drawing process and mills. Four licenses have been sold to Japan and the FRG. [Text] [Moscow NTR: PROBLEMY I RESHENIYA in Russian No 8, 22 Apr-5 May 86 p 2] 7807

SHIP CORROSION PROTECTION--A method of protecting the sections between the bottoms and between the sides, other sections, and other spaces of ships with volatile inhibitors of atmospheric corrosion was developed at the Leningrad Institute of Shipbuilding. Its introduction made it possible to decrease sharply the labor intensiveness of operations and the consumption of varnishes and paints, to improve the quality of protection, and to eliminate difficult labor. [Text] [Moscow NTR: PROBLEMY I RESHENIYA in Russian No 8, 22 Apr-5 May 86 p 2] 7807

OIL RECLAMATION UNIT--A unit for the ultrafiltration of spent petroleum products and the treatment of sewage, which contains petroleum products, as well as the sewage of dairy plants was designed at the Moscow Chemical Technology Institute imeni D.I. Mendeleyev. The unit ensures the reclamation of about 2.5 tons of spent petroleum a day and yields and economic impact of 60,000-90,000 rubles a year. [Text] [Moscow NTR: PROBLEMY I RESHENIYA in Russian No 8, 22 Apr-5 May 86 p 2] 7807

CSO: 1814/248

## U.S. ASSESSMENT OF SOVIET SCIENCE EXAMINED

Moscow ARGUMENTY I FAKTY in Russian No 19, 1986 pp 3, 4

[Article by B. Olginskiy under the rubric "Notes of the Lecturer": "Our Scientific Potential: The Real Picture"; first two paragraphs as ARGUMENTY I FAKTY introduction]

[Text] By the early 1970's few specialists in the United States doubted that the scientific and technical possibilities of the USSR are approximately equal to the American possibilities. Throughout the 1970's in the reports of the National Science Foundation to the U.S. president and Congress it was constantly emphasized that the USSR is not inferior to the United States in the level of expenditures on research and development and in the number and competence of scientists and engineering and technical personnel.

And nevertheless today, when the task of sharply accelerating scientific and technical progress is being accomplished in our country, in America doubts about our success are being expressed in every way. Having forgotten, it would seem, their recent admissions, many American mass media are foretelling our failure.

The reason for such an attitude is clear. Objectivity is being sacrificed to anti-Soviet policy and propaganda. But what, one would like to know, are the arguments which substantiate the skepticism?

### In the Group of Leaders

They speak, in particular, about the "technological lag" of the Soviet Union in several fields. Yes, this is correct. But it is appropriate to note that today, in the age of the rapid development of the scientific and technical revolution, no state, however industrially developed and wealthy it is, can simultaneously be the leader in all fields of industry, science, and technology without exception. Proof of this is the United States.

While still in first place in the capitalist world as a whole and holding leading positions in the majority of fields, the United States nevertheless has fallen noticeably behind Japan, for example, in the watch industry and robotics and in several other spheres which govern technical progress.

Moreover, an official agency for the "gathering of information" on technological innovations of Japan has been established in the United States.

But is such an obvious aspiration of American business to become familiar with Soviet know-how, to which, for example, John Kaiser, counsel to the U.S. president for science and technology, attests, not really significant: "We do not like to say a lot about Soviet scientific and technical achievements, such as first place in space research, the discovery of thermonuclear fusion and lasers, or achievements in more 'prosaic' fields: welding, orthopedic medicine, power machine building, the steel industry, ultradeep drilling, and the technology of processing metals and materials."

So does the USSR lag in anything? It does, of course, and specialists in "their own" fields are well aware of this. But it is important to emphasize with all certainty: this lag is surmountable.

Here is an example of this. At the beginning of the 10th Five-Year Plan the Americans wrote that the Soviet Union is approximately 8-10 years behind the United States in microelectronics. Having studied in 1979 several examples of our circuits, they estimated this lag to be 2-3 years. While in 1981 the January issue of the American journal ELECTRONICS (and it is very authoritative in this field) already notes: "The technological base and the skills of process engineers are enabling the Soviet Union to produce integrated circuits of nearly the same quality as in the United States. The received circuits probably do not reflect the highest technical level of the Soviet Union in this field. The integrated circuits being used in the USSR for its own needs might be technically more advanced." We do not have grounds to reject such conclusions.

It is possible to add to what was said that our country in those instances, when it needs to eliminate a lag, relies on its unique "bank of ideas," which was established as a result of first-class basic research which encompasses the entire spectrum of modern science.

Our Trump Cards: Continuity, Development According to Plan, Boldness

What has been achieved by Soviet science is a result of the following of the traditions of Russian natural science by the new forces which joined science after the revolution, it is a result of the systematic policy of the Communist Party and the Soviet state, which is aimed at the development of basic research.

Not without reason did Academician I.P. Pavlov back in the 1920's proudly show his foreign guests the campus of researchers in Koltushi, which was built with allocations from our state budget, which at that time was very modest. "You have heard and seen what an exceptionally favorable position science holds in my homeland," he said to his colleagues who had come from all parts to the USSR for an international congress.

We know examples, which to this day strike the imagination and border on the impossible. In 1.5 years eight chemists headed by S.V. Lebedev under laboratory conditions developed synthetic rubber. The construction of one

pilot plant and three large industrial enterprises was begun immediately. The large-scale production of Soviet synthetic rubber was launched in 1932. In Germany it began 6 years later, in the United States--even later. Thus, using socialist planning principles and genuine enthusiasm, the Bolsheviks purposely strove, as we now say, for the integration of science and industry.

The Great Patriotic War also gave examples of this integration. During those fiery years, when the fate of peoples was decided on battlefields, Soviet scientists developed fundamentally new, highly efficient technologies which ensured our economic victory over fascism.

For example, the collective of the now world famous Institute of Electric Welding under the supervision of Ye.O. Paton introduced in the Urals a new method of automatic submerged arc welding, which made it possible to put "on stream" the production of the famous "34's"--the best tanks of World War II. Try as the German specialists did--and they, it must be said, were good judges of their work--they were never able to get through to the heart of the "Paton" method of welding.

The overall result of the work of Soviet industry was also natural. While having much less electric power, coal, and steel, the USSR during the years of the war produced more than twofold more tanks than Germany did.

But what about after the war? In the ravaged country, which lost 20 million of its sons and daughters, a collective of scientists under the supervision of I.V. Kurchatov developed atomic weapons and deflected the sword which had been raised over the head of our people. At that time in the West there was no secret which they safeguarded so carefully. Therefore, one could not count on equipment and technology from across the ocean. Our nuclear physics was able to find its own means for solving the large set of most difficult theoretical and experimental problems, which were connected with the development of a nuclear reactor, the separation of uranium isotopes, the control of a fission reaction, radiation protection, and so on. The birth of new powerful sectors of industry, which governed Soviet priority in many spheres of the peaceful use of atomic energy, was also the result of this purely scientific work.

The Cost of a Mistake

It would be naive to think that achievements come of themselves. Speaking in June of last year at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress, President of the USSR Academy of Sciences Academician A.P. Aleksandrov said: "In the 1930's I.V. Kurchatov at the very peak of his first work on nuclear energy was criticized at the assembly of the Academy of Sciences for the fact that he was dealing with a problem 'which does not have a bearing...on practice.' In this case sober reason quickly conquered. But it has been necessary to this day to pay for the mistakes of Academician Lysenko in genetics and selection."

This is indeed the case. In the 1920's, owing to the outstanding achievements of Professor N.I. Vavilov and his colleagues and students, Soviet genetics held leading positions in the world. The discovery and substantiation by N.I. Vavilov of "the law of homologous series in hereditary mutation" were of

exceptional importance for the development of world biological science and agricultural practice.

Today Soviet biologists, the successors of N.I. Vavilov, are restoring the former reputation. For example, owing to original basic research the Soviet microbiological industry annually produces 1.5 million tons of artificial nutrient protein--more than all the other countries of the world. Our scientists, who work in the field of genetic and cellular engineering, have developed human interferon--a most powerful means of increasing the resistance of the body to diseases--and synthetic somatotropin.

Borrowing Soviet Know-How

Returning to atomic energy, it is possible to state without exaggeration: the priorities in this field in the end were also determined by the basic scientific research of physicists. While these priorities are generally recognized.

The aspiration of western countries, first of all the United States, to borrow Soviet know-how is also quite natural. In the 1970's the largest American companies actively participated in the implementation of the agreements between the USSR and the United States on scientific and technical cooperation in a large number of fields. "The information in the field of controlled thermonuclear fusion, which was obtained as a result of cooperation," F. Press, counsel to the U.S. president for science and technology, noted later, "saved the United States up to 2 years on experimental work and about $10 million."

Another convincing testimony to the closest attention in the United States to Soviet basic scientific research is the full and prompt translation of over 100 Soviet scientific journals. The U.S. Institute of Physics, in particular, translates in full 20 of our journals. The matter, of course, is not limited to journals. American specialists are appealing for the more active use of the science books published in the USSR, especially in such important fields as vibration engineering, welding, die casting, continuous and precision casting, in which Soviet scientists and engineers have achieved important gains.

It is appropriate to note that during the second half of the 1950's under the influence of the "sputnik shock" the establishment of statewide organs for the planning and management of scientific activity was begun in the majority of capitalist countries. The scientific and technical achievements of the Soviet Union and the so impressive level of basic research forced the U.S. Government to expand drastically the system of higher and secondary specialized education.

Our Discoveries Are Also for Us to Use

From the foregoing one should not draw the conclusion that we have solved all the problems in the area of the scientific and technical revolution. Of course, we still have serious omissions which first of all concern the introduction of scientific achievements in production. Take if only the state

of affairs in metallurgy. Specialists state: of the 13 most important innovations of the postwar period in ferrous metallurgy not one belongs to the United States. More than half of them are a result of discoveries of Soviet scientists and engineers.

Today, for example, in all the countries of the world more than 60 percent of the metal is obtained by the method of the continuous casting of steel, which was invented and introduced for the first time in practice by our Tula specialists. But, having purchased licenses from the USSR, Japan, the United States, the FRG, France, and other states of the West quickly disseminated this method there. We have fallen behind here. As a result we cannot properly use the truly enormous impact which is incorporated in this technology.

There is another example. It is well known that a number of western firms took part in the construction of the Novyy Oskol Electrometallurgical Combine. But the operation of this enterprise is based on a fundamentally new technology. Meanwhile far from everyone knows that it was developed by Soviet scientists and specialists. Unfortunately, having adopted our discoveries, Western manufacturers were able to set up production earlier.

From similar facts, which we are by no means concealing--the Soviet press and television, as we know, abound in pointed critical statements on the problems of scientific and technical progress--Western propaganda is drawing the conclusion about a certain conservatism of our socialist economic system, contrasting it with the "efficient" capitalist system. Enough! According to estimates of the U.S. Department of Commerce only 10 percent of the American firms are "adequately" using the technical achievements available in the country. If they also used the remaining 90 percent of them, labor productivity in the U.S. processing industry would increase by at least threefold.

Of course, we have enough conservatism. But this is the conservatism not of the system, but of people, who at times also hold high positions, and sometimes of entire collectives, which avoid novelty, creativity, and some risk taking, which is inevitable when introducing something new.

A frank discussion of these and many other questions of the acceleration of scientific and technical progress, which we have to settle in the shortest time, took place at the 27th CPSU Congress. And the fact that we are not glossing over our difficulties, but soberly realize what has not yet been done and see what has to be done, gives us confidence in the future.

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## TURKMEN INSTITUTE OF SCIENTIFIC, TECHNICAL INFORMATION

Ashkhabad TURKMENSKAYA ISKRA in Russian 1 Jul 86 p 3

[Article by K. Mukhamov, director of the Institute of Scientific and Technical Information and Technical and Economic Research of the Turkmen SSR State Planning Committee: "A Matter of Great Importance"]

[Text] The emergence of the state system of scientific and technical information in our country is inseparably connected with the name of V.I. Lenin, who regarded information on the latest achievements of world science and technology as a matter of vital state importance. In the opinion of Vladimir Ilich, without information it is impossible to imagine progress in any field of science, technology, and production.

The leader of the young Soviet state looked at the questions of scientific information in inseparable connection with the tasks of the economic development of the country. He observed with keen vision everything that was newest and most promising in the development of science and technology, directed the attention of specialists and economic managers to scientific discoveries, and taught people to approach them from a statewide position and to evaluate them from the standpoint of both the immediate economic advantage and the general directions of the development of the socialist economy. Vladimir Ilich raised the question of the need for the planning and coordination of inventing activity on the scale of the entire country.

Lenin's dream captured the hearts and minds of Soviet scientists, engineers, workers, and all the working people of our homeland. The decree of the USSR Council of Ministers "On the Statewide Scientific and Technical Information System" became the program document on the establishment in our country of a well-balanced system of the information service of specialists.

The state scientific and technical information system was established in conformity with the decisions of the party and government. At present 11 all-union, 87 central sectorial, and 14 republic institutes of scientific and technical information, 113 intersectorial territorial centers at large enterprises, scientific research institutes, and planning and design organizations, and 1,700 scientific and technical libraries, which perform the functions of scientific and technical information departments and bureaus, are in operation in the country.

An important aspect of their activity is the gathering of materials on the gained experience and on the inventions and efficiency proposals being used, the sending of this material to republic, territorial, and central sectorial information organs, as well as the organization of their introduction in production.

One of the basic tasks in the development of the USSR national economy for 1986-1990 is the speeding up of the pace of scientific and technical progress. In the resolution of the 27th CPSU Congress on the Policy Report of the Central Committee it is noted: "The congress obliges party, soviet, economic, and public organizations to take as the basis of all their activity the strict implementation of the program directives on the changeover of the national economy to the intensive means of development."

For the accomplishment of this vital task it is necessary to develop in every possible way the creative activity of workers and innovators and the movement of inventors and efficiency experts, to improve the activity of scientific and technical societies, and to improve the scientific and technical information system.

In 1964 the Turkmen Affiliate of the Central Asian Interrepublic Institute of Scientific and Technical Information and Propaganda was established in Ashkhabad. As of 1979 it began to be called the Turkmen Scientific Research Institute of Scientific and Technical Information and Technical and Economic Research.

Measures, which have been taken from domestic and foreign information sources, are being introduced extensively in practice with the assistance of specialists of the institute and the scientific and technical information services of enterprises and organizations. During the years of the 11th Five-Year Plan about 7,000 innovations were introduced in the republic. The economic impact from their introduction exceeded 86 million rubles.

Systematically studying, analyzing, and generalizing domestic and foreign experience, the institute prepares analytical materials of a recommendatory nature, which are used for making decisions on the development of science and technology. A report on the most important domestic and foreign achievements, which have been recommended for inclusion in the national economic plan, is prepared for the planning organs of the republic. The materials of the report are used when drafting plans of economic and social development.

Last year's recommendations of the report, for example, were introduced in the system of the Ministry of Trade. The method of transporting cargo with the use of container equipment was used at 20 stores of the Leninskiy and Sovetskiy Rayon Food Trade Organizations of Ashkhabad. According to the preliminary data, the economic impact from the introduction of this innovation will come to about 200,000 rubles.

A number of recommendations of the report--the chemical preservation of fodders, an effective compound for the treatment of diseases of large-horned cattle, a method of cultivating rice on saline soils, the collective contract

in agriculture, the conversion of the PSB-1.6 picker for loading fertilizers onto vehicles, a device for the cultivation of the strips of vineyards, which are close to the vines--were planned for introduction at the kolkhozes and sovkhozes of the republic.

However, the indicator of the introduction or the inclusion in the plans of introduction of the recommendations of the report is lower than the level of past years of the 11th Five-Year Plan.

An analysis makes it possible to determine the factors which are hindering the introduction of the recommendations. The main one of them is the reluctance of several ministries and departments to recognize the need for the use of the recommendations of the report when formulating plans. The report is lying too long in documents, decisions on the use of its recommendations are not being made. To the inquiries of the institute these ministries either maintain silence or explain their refusal by the lack of an experimental base, financial resources, and so on.

That is what happened with the recommendations of the report for the ministries of construction and the construction materials industry. With allowance made for the formation of a large amount of substandard reinforced concrete and concrete scraps in the republic the institute included the recommendation on the use of a unit for their processing. From the introduction of such a device it would have been possible to derive an economic impact of more than 100,000 rubles. An innovation for the protection of construction materials and components against corrosion, the economic impact from the introduction of which would have come to about 200 rubles per cubic meter of metal components, was recommended for these ministries.

The experience of the leading enterprises and organizations is covered in the information leaflets which are published by the institute. Annually 250 information leaflets on the scientific and technical achievements and advanced production know-how of enterprises of the republic are published. Numerous requests for the technical specifications of the innovations, which are described in our information leaflets, arrive from all corners of the country.

Reference information support, which is based on the use of the collection of documents of the institute and scientific and technical information organs of different levels, is the basis for the activity of the institute. The size of the collection in the past 5 years has increased by 2.5-fold. Patent documents hold a special place in it. Their amount increased by nearly threefold.

A number of design and scientific research operations, which were performed by the institute during the 11th Five-Year Plan, concluded with the placement into commercial operation of an automated scientific and technical information system within the multiple-user association of the republics of Central Asia and Kazakhstan. This made it possible to change the basic type of service over completely to an automated mode, having ensured in so doing a wide range of retrieval and the promptness of the issuing of information. This system in the future will ensure the issuing of information for one-time requests with

allowance made for a retrospective search on the basis of the interaction of the automated centers of the country.

Last year the institute completed one of the first scientific research operations in the country on the creation of a problem-oriented database on arid themes.

The publications of the institute supplement the information supply of various categories of users. During the years of the 11th Five-Year Plan the demand for them increased by twofold. The institute now publishes about 350 titles of information materials with a total circulation of more than 150,000 copies and makes about 1.5 million sheet-copies of duplicated works.

The work on the tracking and information support of the comprehensive goal programs, of which enterprises and organizations of our republic are the performers, was assigned to the institute by a decree of the USSR State Committee for Science and Technology. In accordance with this assignment, the institute is carrying out the information support of 20 programs and subprograms, 2 of which are on the Food Program.

Having entered the first year of the 12th Five-Year Plan, the collective of our institute is taking all steps for the successful fulfillment of the plan and the socialist obligations which were assumed for 1986.

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## BELORUSSIAN COMPUTER-AIDED DESIGN SYSTEM OF FOUNDATIONS

Moscow STROITELNAYA GAZETA in Russian 29 Jun 86 p 2

[Article by STROITELNAYA GAZETA correspondent V. Perzashkevich under the rubric "A Fast Pace for Technical Progress" (Brest-Minsk): "Dialog With a Computer"; first paragraph is STROITELNAYA GAZETA introduction]

[Text] The Construction Comprehensive Program, which was formulated in Belorussia, includes the section "Automation." It is envisaged to develop and introduce during the 12th Five-Year Plan 17 computer-aided design systems (SAPR) of facilities of industrial and civil construction. It is anticipated that the annual economic impact from their introduction will come to about 10 million rubles.

### In One City in an Outlying Area

The technological line of the computer-aided designing of prefabricated strip foundations, which was developed at the Brestgrazhdanproyekt, made it possible in 1985 to save 320,000 rubles.

A map of the Soviet Union, on which there are indicated the sites where the introduction of such lines is under way, hangs at the institute. Thus, they are dispersed throughout the country, and today there are already more than 20 of them. This work was nominated for the prize of the Belorussian SSR Council of Ministers.

It must be admitted: the specialists "taught" the computer to design the optimum parameters of foundations as a whole and their individual components. The situation, when the designer keeps on the safe side and incorporates in some components or others of a building an obviously excessive margin of safety, is impossible here. The computer is dispassionate and does its job only on the basis of the most precise calculations. Hence, too, the saving, first of all of precast reinforced concrete. At the first 240 projects, for which the already prepared documents were corrected at the Brest Institute with the aid of a computer, it was possible to save as much material as is required for the laying of the foundations 29 apartment buildings with 100 apartments each. Well, according to the official data, which have already been confirmed by practice, the saving of reinforced concrete items comes, as a rule, to 20-25 percent. While the labor productivity of designers of the

below-grade work increased by three- to fourfold. Now 5 people cope with the work, for which 15 were required.

"An advanced designing technology, which ensures the interaction of the system with its user by means of graphic images, which are customary for him, and in a time scale, which makes it possible to carry out multivariant designing, is realized in the development of the Brestgrazhdanproyekt."

This is an excerpt from the official opinion of the Kiev Zonal Scientific Research and Planning Institute of Standard and Experimental Designing of Residential and Public Buildings on the work of the Brest specialists. And there is another opinion--of G. Adamenko, deputy director of the Institute of Mathematics of the Belorussian SSR Academy of Sciences: "The comprehensive automation of operations has been accomplished for the first time in construction designing practice. The possibility of multivariant designing and a significant saving of materials in the process of construction is appearing. Specialists of the construction type were able to simulate on a computer the logic of the thinking of a designer and to improve it."

But Why Precisely in Brest? And Precisely Foundations?

Indeed, questions might arise for the reader: But why is it a question only of foundations? And why is the problem being worked on in an outlying area, at a comparatively small institute, which, as if to put it a bit more mildly, is by no means an arbiter of fashion in designing? Its task consists mainly in the tying in of standard designs to the site. Here, at this phase, let us also stop. For the tying in of a design to a site for the most part also reduces to the designing of foundations.

Here, too, is the answer to the question: Why is it is question of the automation of the designing of precisely foundations? And why an outlying area--Brest?

After returning from Moscow, from courses for the improvement of the skills of management personnel, in which he heard enough about the miracles of electronic equipment, and "having gotten worked up" about it, 7 years ago institute director M. Takoyev ordered the young designers Nikolay Shikasyuk, Mikhail Tsinman, and Sergey Zuyev to leave for...the machine building enterprise. There automatic equipment was already putting out drawings.

There were, of course, months of mastering the new job. But then.... The institute received a set of electronic equipment, a special department for this maintenance was established, 50 programs were developed. Such was the beginning.

Now, by having a structural plan of the building (more precisely, its basement part), calculations of the loads (all this is in the standard design), as well as materials on the geological conditions of the construction site, the designers convert the data into a specially developed language and feed them into the computer. On all this 2 hours are spent. If subsequently one has to deal with the tying in of the same standard design (but to a different site), then it will be necessary merely to feed into the computer the geological

engineering indicators of the construction site. On this 20-25 minutes will be spent. The computer itself will make a general analysis of the arisen situation, will make the optimum structural decision, and will prepare all the necessary graphic information, on which just a few minutes will be spent. Now it is possible with the aid of a plotter to put out a full layout drawing of the foundation slabs, their sectional view, the dimensions, the degree of cutting into the ground, as well as legends, dimensions, axes, parts lists, notes, and the title block. For accuracy the designer first displays the finished drawing on the display screen.

Right Here Creativity Also Begins

In the automated line, which was developed at the Brestgrazhdanproyekt, there is its own special feature, which does not have analogs in our country. The choice of the best version in situations, which have several solutions, is made in the form of a dialog of man with the computer. The designer can display on the display screen both the entire drawing and some block of it or even a separate part. Of course, with the design data. When giving an answer, the computer simultaneously asks (the question is on the screen) whether to carry out the drawing further in accordance with the same parameters or whether there will be any changes. When there is a need to compare the parameters of a component with others which are produced in our country, the designer can immediately obtain exhaustive information about them. Having been convinced that the optimum version has been selected, the designer gives a command to the plotter to produce the finished drawing.

Standard domestic computer hardware constitutes the basis of the automated technological line. This means that it is possible to introduce it extensively. It does not require special "additional training" of the computer, since the program is directly oriented toward design engineers. At the Brestgrazhdanproyekt a group of specialists, who previously dealt with traditional methods of designing, has been established for the maintenance of the line. As experience showed, less than a month is required for the organizational and technical changeover.

Now at the institute they are using electronic equipment for the designing of all the below-grade work. The computer selects the optimum version of the layout of the floors and the in-situ restraints of the joints with the brand of concrete, which is necessary for this, specifies the cross-section and types of reinforcement, and produces the finished drawing. While, as is known, the floors, lintels, and inside walls in the basement in principle are the same as between stories.

In general, a course has been set for the automation of the designing of the general construction section of the entire building.

The Brest enthusiasts are now directing their attention to the designing of brick buildings and intend to proceed from them to the components of large-panel house building. Then it will be sufficient for the architect merely to suggest an idea of the structure, and with the aid of a computer calculations of the versions of its embodiment will be made. It is interesting in this connection to examine the "time factor." Less time will be spent on the

selection of a version and the preparation of documents than on the simple tying in of a ready-made design to the site. Of course, this is a matter of the future, although not that distant a future.

They are also dealing with computer-aided design systems at other institutes of the republic. At the Belorussian Institute of Industrial Planning, for example, they are introducing a technological line of the designing of one-story industrial buildings and are assimilating programs of the automation of the designing of ventilation systems, external mains services, and individual construction components--columns, girders, foundations, and so on. The collective of the Belorussian State Planning Institute is working on the automation of the turning out of estimates and has already begun to turn them over to contracting organizations. It is possible to carry out their further processing on a computer.

The question of establishing special departments in Brest and Minsk is now being considered. This should speed up the interesting and important work on the automation of designing, which has been started in these cities. It is proposed to use personal computers like the YeS-1840, the production of which has been assimilated at the Minsk Production Association of Computer Hardware, and the set of programs which were developed by the Institute of Cybernetics of the Belorussian SSR Academy of Sciences.

The experience of the Brestgrazhdanproyekt and several other institutes convinces us that 30-35 percent of the process of designing already in the very near future can be automated.

The prospect is tempting and fascinating. Purposeful efforts of the designers and producers of electronic equipment are needed. Time is pressing.

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## LITHUANIAN INVENTING, EFFICIENCY WORK EXAMINED

Vilnius SOVETSKAYA LITVA in Russian 2 Apr 86 pp 1, 3

[Article: "In the Permanent Commissions of the Lithuanian SSR Supreme Soviet"]

[Text] At the joint meeting of the commissions of the Lithuanian SSR Supreme Soviet for science and technology and for industry it was discussed how the requirements of the Statute on Discoveries, Inventions, and Efficiency Proposals are being observed in the republic in the matter of stimulating the activity of inventors and efficiency experts and accelerating scientific and technical progress.

During the 11th Five-Year Plan by means of the use in production of 373,000 inventions and efficiency proposals an economic impact in the amount of 414.7 million rubles was obtained. Last year 64,000 innovators took part in this activity. The collectives of the ministries of motor transport and highways and the construction materials industry, the Plunge Plant of Artificial Leathers, the Kaunas Rayon Agroindustrial Association, and others--the winners of the republic socialist competition in this area--achieved rather good results in the use of inventions and efficiency proposals.

At the same time the commissions and the deputies, who spoke at the meeting, noted that many oversights are still occurring in inventing and efficiency activity, it is insufficiently goal-oriented and effective and is contributing little to the acceleration of scientific and technical progress and the increase of the efficiency of social production. One of the causes of the shortcomings is that the managers and chief specialists of production associations, enterprises, and farms are not devoting proper attention to invention and efficiency promotion. In recent years the number of inventions, which are used in the national economy, has been decreasing. Annually about two-thirds of the inventions are not introduced. The majority of inventions, which have been developed at institutes of the Academy of Sciences and higher educational institutions of the republic, are intended for the solution of not production, but specific scientific research problems. The planning and design and pilot experimental base of scientific research institutions and higher schools is not completely meeting the demands of scientists and production innovators.

Many associations and enterprises of the republic are using inefficient inventions. Only about 13 percent of the inventions, which are introduced in production, radically improve equipment and technology. At enterprises and organizations of the ministries of local industry, the furniture and wood processing industry, and construction one used invention in four was developed 12 years and more ago. Often such inventions are already obsolete and do not conform to the best indicators of reliability and economy. The economic impact of only one out of every two inventions and efficiency proposals, which have been used in the national economy, is taken into account. The socialist competition for the achievement of the best results of this work is still not organized well enough. In the economic efficiency of the used inventions and efficiency proposals the republic holds one of the last places in the country.

The requirements of the Statute on Discoveries, Inventions, and Efficiency Proposals and other enforceable enactments are often not observed in the organization and development of inventing and efficiency activity. At enterprises of the ministries of construction and light industry, at the Kaunas Experimental Plant of Automation Equipment imeni E. Ozarskis, the Elfa Production Association, and other enterprises of union subordination the deadlines of the examination of efficiency proposals are being violated, the author's reward is not being paid in good time to innovators, errors are being made in the calculation of the economic impact and in the keeping of an account of the proposals of inventors and efficiency experts. The assets, which are intended for invention and efficiency promotion, are not being used completely. During the 11th Five-Year Plan 11.4 million rubles for these needs remained unused.

The Lithuanian Republic Council of the All-Union Society of Inventors and Efficiency Experts and the city and rayon councils are devoting inadequate attention to the development and improvement of inventing and efficiency work and do not know how to protect the rights of inventors, monitoring is often superficial and inefficient. In many labor collectives the primary organizations of the All-Union Society of Inventors and Efficiency Experts are inactive.

The commissions regard the activity of the majority of labor collectives of the republic in the area of invention and efficiency promotion as unsatisfactory. They recommended to production associations, enterprises, farms, and organizations, taking as a guide Article 10 of the USSR Law "On Labor Collectives and the Increase of Their Role in the Management of Enterprises, Institutions, and Organizations," to discuss at the general assemblies (conferences) the state of invention, efficiency promotion, and creative scientific and technical work and, having exercised the granted powers, to take specific and decisive steps on the radical improvement of this work.

The deputies expressed the idea that it is necessary to develop and strengthen without delay the planning and design and pilot experimental base, on the basis of which it would be possible to promptly produce and test the technical innovations, which have been developed by scientists and innovators, and to prepare instruments, machines, and equipment for series production.

The State Planning Committee jointly with interested ministries and departments is obliged to prepare and implement measures that make it possible to use promptly in the national economy of the republic the most effective inventions, which would radically improve equipment and technology, would improve product quality, would save raw materials, materials, and energy resources, and would decrease production expenditures.

The Lithuanian Republic Council of the All-Union Society of Inventors and Efficiency Experts, as well as the city and rayon councils and the primary organizations should work more purposefully and skillfully.

The commission recommended to improve the Statute on the Socialist Competition of Ministries, Departments, and Production Collectives in Invention and Efficiency Promotion, emphasizing the effectiveness of this activity.

More attention should be devoted to the training and increase of the skills of the specialists who work in the area of invention and efficiency promotion, the activity of young inventors and efficiency experts should be stimulated in every possible way.

Specific suggestions, the implementation of which will contribute to the more efficient introduction of inventions and efficiency proposals in the national economy and the development of the creative scientific and technical work of workers, as the decisions of the 27th CPSU Congress, as well as the 19th Lithuanian CP Congress require, were presented in the decision which was adopted by the commissions.

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AWARDS AND PRIZES

## WORK ON EFFECTS OF RADIATION ON CELLS VIES FOR STATE PRIZE

Moscow PRAVDA in Russian 24 Jul 86 p 3

[Article by Academician of the USSR Academy of Medical Sciences L. Ilin under the rubric "For the USSR State Prize": "The Beam and the Cell"]

[Text] A new scientific discipline--radiobiology--has emerged at the junction of nuclear physics and biology. Its achievements have also yielded a practical outcome: ionizing rays are now being used extensively in the national economy and medicine. Suffice it to name the sterilization of medical materials and instruments, the preservation of foodstuffs, and the radiation therapy of malignant neoplasms.

In all these cases the fundamental property of ionizing rays--their ability to cause the death of living cells, starting with bacteria and ending with the cells of man--comes to the forefront. The mass death of cells of a living organism when exposed to radiation is also the basis of radiation sickness. About 30 years ago, when nuclear weapons tests assumed a large scale, when the remote serious aftereffects of the irradiation of people at Hiroshima and Nagasaki were made public, the public at large began to understand the insidious property of nuclear weapons--to affect everything living with ionizing radiation. Precisely for this reason medical scientists have advanced scientifically sound arguments, which with all obviousness attest to the inevitably fatal nature of nuclear war for life on earth.

The accident at the Chernobyl Nuclear Electric Power Plant once again reminded us of what a threatening force is contained in the atom, which has gotten out of the control of man, and of what danger high doses of nuclear radiation are. However, Soviet medicine was not taken by surprise by this event. Our physicians were prepared to give assistance to the victims of the accident. In this the basic research of Soviet radiobiologists plays its own important role.

The protection of the body against the destructive effect of radiation, as well as the timely diagnosis and treatment of radiation sickness are impossible without an understanding of the mechanisms of the radiation death of cells. Soviet scientists have made a large contribution to the study of this problem. Among the central tasks here were the tasks of identifying the reaction to irradiation of various cells of the body, the study of the latent

molecular processes which lead to their death, and on their basis the development of methods of the protection and treatment of the irradiated body and the finding of simple and accessible methods of the early diagnosis of radiation sickness. Lymphoid tissue is the most radiosensitive tissue in the body of animals and man. The mass death of lymphoid cells occurs already in the first hours after irradiation. Meanwhile these cells, or lymphocytes, play a vital role in the regulation of blood circulation and in the maintenance of the immunity of the body to the most different infections. For many years the high radiosensitivity of lymphocytes remained a mystery. For multiplying or dividing cells are usually more radiosensitive. This property of them has been used for a long time in the radiation treatment of malignant neoplasms. Lymphocytes are nondividing cells, and, thus, their death is simply not connected with division.

For the finding of means of aiding the irradiated body it was necessary to understand the reasons for the high radiosensitivity of lymphoid cells. As a result of the conducted research it turned out that the effect of radiation on lymphocytes leads to rapidly advancing changes in the properties and functions of biological membranes, in the activity of a number of key enzymes which regulate metabolism, and in the energy state of cells and their ion balance.

Effective systems of controlling the activity of enzymes exist in the healthy, nonirradiated lymphocyte. The effect of radiation disturbs them, the "out of control" nuclease affects the DNA molecule, which leads to its decomposition and, as a consequence, to the death of the cell. It is significant that the loss of control functions by the cell occurs not immediately after irradiation, but after some time.

It was possible to trace the stages of this process. It turned out that specific protein factors appear in irradiated lymphocytes. Apparently, precisely under their influence the nucleases also decompose DNA. Scientists came to the fundamentally important conclusion that the dead of irradiated lymphocytes in the end occurs in case of the triggering of specific biochemical reactions. The process of death is controllable. For example, several antibiotics suppress the synthesis of protein and can prevent the decomposition of DNA in irradiated lymphocytes, protecting them against death.

It should be emphasized that this research of Soviet radiobiologists yielded the key to the understanding of a general biological phenomenon--the physiological death of cells, which is the basis of the constant change of the cellular composition of tissues of the body. This helped scientists to formulate the concept of the existence of a special genetic program.

The study of this problem to a substantial degree also contributed to the accomplishment of one of the important practical tasks of radiation medicine--the development of methods of the early diagnosis of radiation sickness. It was shown that the products of the decomposition of DNA from dying lymphoid cells enter the blood, and then are eliminated from the body. Their quantity depends on the dose of radiation and the time after exposure and can serve as an indicator of the seriousness of radiation sickness.

The work "The Elaboration of the Theoretical Principles of the Phenomenon of Cell Death and Their Use for the Explanation of the Pathogenesis of Radiation Sickness" was the result of the research of a collective of Soviet scientists from the Institute of Biophysics and the Central Scientific Research Institute of Roentgenology and Radiology of the USSR Ministry of Health, the Institute of Biological Physics of the USSR Academy of Sciences, and the Scientific Research Institute of Medical Radiology of the USSR Academy of Medical Sciences, which is of a priority nature, was repeatedly confirmed in later works of foreign researchers, and made an outstanding contribution to the development of radiobiology. This, undoubtedly, important world achievement of our radiobiology has been deservedly nominated for the USSR State Prize.

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AWARDS AND PRIZES

## WORK ON NEUTRON SCATTERING NOMINATED FOR STATE PRIZE

Moscow IZVESTIYA in Russian 26 Aug 86 p 3

[Article by Academician Yu. Osipyan under the rubric "For the USSR State Prize": "Neutrons in the Study of Crystals"]

[Text] All mankind is using the achievements of solid-state physics: the development of new semiconductor, magnetic, and optical media in the form of crystalline, amorphous, and liquid-crystal materials is providing us with the latest machinery and radio and television equipment.

Painstaking basic research stands in the way to the development of new materials. The most diverse theoretical concepts and methods of research, including ones which are based on the phenomena of the scattering by crystals of penetrating radiation, are used here.

The enormous role of penetrating rays when studying the structure of matter was determined already at the dawn of modern physics: the well-known experiments with alpha particles laid the foundation of our notions about the structure of the atom, the studies of the scattering of X-rays made it possible to determine the arrangement of atoms in crystals, liquids, and molecular and biologically active substances. With the appearance of nuclear reactors the study of matter by means of the scattering of slow neutrons, the penetration of neutron methods into condensed-state physics, chemistry, biology, and material science, and the formation of an independent interdisciplinary field of knowledge became possible.

For the realization of the possibilities of neutron methods in the study of the structure of matter it was necessary to develop a theory of the interaction of neutrons with matter, to elaborate new experimental methods, and to create sets of intricate modern equipment. Precisely these tasks were successfully accomplished in the series of works "The Elaboration of the Physical Principles and the Development of New Methods of the Study of a Solid by Means of the Scattering of Neutrons in Stationary Nuclear Reactors," which has been submitted for the State Prize for 1986. This series concludes a specific stage in the development of the neutron methods of studying matter in our country, which summarizes the many years of efforts of specialists of the leading nuclear centers of the Soviet Union.

The consistent implementation of experimental developments enabled the authors to develop a neutron diffractometer on a completely new basis. This instrument ensures the conducting of studies of the structure and transformations of matter in a very short time, even on samples of small size, under extreme conditions--at very low and higher temperatures, under high pressures, and so on. Other unique experimental units and methods developments are also affording extensive possibilities.

The close accord of the results of experimental research and their theoretical interpretation is a characteristic feature of the submitted series. As an example it is possible to indicate the completely new contribution of the authors to the problem, which has already been known for a long time, of the directed improvement of the properties of construction materials and to the discovery of a new class of physical phenomena in magnetic crystals, which occur in them during the transition from one state to another.

The original domestic developments and the results, which were obtained by means of them, are well known and enjoy recognition in our country and abroad. The authors have made a large contribution to the writing of monographs and surveys (both at a very high scientific level and popular science ones) and to the training of highly skilled specialists for other scientific centers. The main service of the collective of authors consists in the assurance of a high and, in a number of cases, a leading level of research in the urgent field of solid-state physics and in the preparation of the transition to the extensive use of neutron methods for the purposes of modern material science.

The series of works, which was completed by a group of scientists who have made a decisive contribution to the formation and development of the new and promising field of science, has been deservedly nominated for the 1986 USSR State Prize.

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## MELIKISHVILI PRIZE AWARDED TO RAMAZ LAGIDZE

Tbilisi ZARYA VOSTOKA in Russian 9 Jul 86 p 1

[Article by Dzhilda Ivanishvili under the rubric "A Fact Close Up": "A Beacon in the 'Sea' of Hydrocarbons"; first paragraph is ZARYA VOSTOKA introduction]

[Text] The P.G. Melikishvili Prize of the Georgian Academy of Sciences has been awarded to Corresponding Member of the Georgian SSR Academy of Sciences Professor Ramaz Lagidze for the monograph "Sintez i prevrashcheniya zameshchennykh dibenzopentalanov i aralkilgalogenidov" [The Synthesis and Conversions of Dibenzopentalans and Aralkyl Halides].

This prize is presented once every 3 years to scientists of Georgia for outstanding research in the field of physics or chemistry. Since 1959 Academicians of the Georgian Academy of Sciences G. Tsitsishvili, V. Asatiani, and others have been the holders of this honorary award. Now the name of Ramaz Lagidze has also supplemented this list of prominent researchers.

The monograph, for which the scientist received the prize, was published by the Metsniyereba Publishing House in 1984 at the suggestion of the Institute of Physics and Organic Chemistry imeni P.G. Melikishvili of the Georgian SSR Academy of Sciences, where Ramaz Mitrofanovich is in charge of the Laboratory of Organic Synthesis. For more than 40 years R. Lagidze together with his associates has been conducting research on hydrocarbons, to which an enormous role is being assigned in the study of organic synthesis. That is why hydrocarbons at times have the names of the scientists who discovered them. The organic compounds, which were studied by Ramaz Mitrofanovich, in chemical literature also acquired fame as "Lagidze hydrocarbons."

"The basic research in this field," Ramaz Mitrofanovich said, "is intended for the distant future. At times 10-12 years are spent on the testing and checking of biologically active substances. In a number of instances the preparations in this case become obsolete. Therefore, a new approach to the settlement of this important question is needed here, while the use of computer equipment is needed for speeding up the introduction of new preparations."

In the opinion of prominent researchers of our country, R. Lagidze has furnished specialists with a reference book which is necessary in research and practical work.

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BRIEF

SHPAK NAMED HONORED FIGURE OF SCIENCE--Ukase of the Presidium of the Ukrainian SSR Supreme Soviet. On the Conferment on Corresponding Member of the Ukrainian SSR Academy of Sciences M.T. Shpak of the Honorary Title of Honored Figure of Science of the Ukrainian SSR. For services in the development of physical science and the training of personnel and in connection with his 60th birthday to confer on Corresponding Member of the Ukrainian SSR Academy of Sciences Marat Terentyevich Shpak the honorary title of Honored Figure of Science of the Ukrainian SSR. [Signed] Chairman of the Presidium of the Ukrainian SSR Supreme Soviet V. Shevchenko. Secretary of the Presidium of the Ukrainian SSR Supreme Soviet N. Khomenko. Kiev, 11 April 1986. [Text] [Kiev PRAVDA UKRAINY in Russian 13 Apr 86 p 1] 7807

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INTENSIFICATION-90 PROGRAM, CHANGES IN INDUSTRY, SCIENCE

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 10, 20 May 2-Jun 86 p 6

[Interview with Academician Igor Alekseyevich Glebov, chairman of the Presidium of the Leningrad Scientific Center of the USSR Academy of Sciences, by V. Kovichev under the rubric: "Youth and Creativity": "Academician I. Glebov: 'Time Favors the Young'"; date, place, and occasion not given; first three paragraphs are NTR: PROBLEMY I RESHENIYA introduction]

[Text] At the end of May the last bell will ring at schools. The graduates have to choose their path in life. For them nearly the most crucial moment is coming.

The choice is extremely difficult. It is necessary to determine one's fate now, when the entire national economy and all of society are at a turning point. And here not simply kind, but qualified parting words and the authoritative opinion of the person who has a good idea of the character of occupations of the future, are needed.

We also turned for this to Chairman of the Presidium of the Leningrad Scientific Center of the USSR Academy of Sciences Academician I.A. Glebov, one of the authors of the Intensification-90 Program, the first territorial-sectorial program in our country.

[Question] Igor Alekseyevich, if you consider that not less than 5 years are required for the mastering of an occupation (I believe this is also correct for those who do not intend to continue studies at a higher educational institution or tekhnikum), today's graduates of schools will enter independent life in the early 1990's. Precisely when the results of the first program of intensification will already be showing. How will the typical works, which young people are to enter, look?

[Answer] Typical? Well, let us take, say, the sphere of metal working, which is typical of Leningrad industry. Here to this time the basic personnel component is machine tool operators. Lathe operators, milling machine operators.... For many people the notions of work at a plant are connected first of all with these occupations.

For a long time, indeed, the entire problem of training a regular labor force in machine building reduced to attracting a sufficient number of young people to a vocational and technical school or a works. The rest, as they way, is a matter of equipment--moreover, of course, equipment to which we have become accustomed. It is quite easy to train a worker of high, and not too high, skill for attending general-purpose machine tools. I am not speaking, of course, about virtuoso lathe operators, ace milling machine operators--people are rising all their life to such a level of skill. But we are speaking about what is typical. The predominance of general-purpose machine tools at metal working enterprises makes it incumbent "to fight not so much with ability as with number."

Now one can no longer accomplish in this way the tasks--both quantitative and qualitative--which face us. And, therefore, a different means was chosen.

It is envisaged by the Intensification-90 Program to introduce 2,600 objects of automation, moreover, not to equip individual workplaces with robots and automatic machines, but to change over to the comprehensive automation of the entire "research--production" cycle.

General-purpose machine tools are already now being actively replaced by NC machine tools and more complex ones--automated sections and NC modules, which are controlled from one workplace. The next stage is the formation from such sections of shops, and then automated plants, as they sometimes say, "unmanned" works. That is, a portion of today's graduates will get already in the early 1990's a workplace in an "unmanned" shop, others will have occasion to participate in the equipment of such workplaces.

[Question] Is one, as they say, to try on overalls with a white collar?

[Answer] Not everything is that simple. This advanced and, it must be said, very expensive equipment justifies the expenditures and yields the anticipated impact only in case of the observance of specific conditions. Things with it are all right, so long as everything is all right.

But any malfunction turns into irrecovable losses. A flexible machine system cannot "apply more pressure," making up for lost time, and work in spite of feeling bad, it cannot but notice that they gave it the wrong thing, of the wrong quality, material in the wrong quantity, and so forth. A flexible machine system is uncompromising: it yields exactly as much output as has been incorporated in the program--no more, no less. And it is categorical: if a breakdown occurs in one insignificant section, in some one unit, the entire automated line stops. Start the calculation of the losses from this second. And they are many times more extravagant than from the downtime of one, say, general-purpose machine tool. It is also difficult to imagine them.

[Question] But let us imagine....

[Answer] Well, a machine tool stopped. The situation is well known: a great misfortune did not happen--the shop continues to work as if nothing happened. The lathe operator, if he is not able to eliminate the trouble himself, either will move to another machine tool (this is not a problem, if there are not

enough machine tool operators, there is always a surplus of machine tools) or will go to get a mechanic. And together with him, or having relied on him, will wait for the completion of the repair. It is better that minutes would be spent on this, but it happens that hours are also spent on this. However, the shop will operate. But an automated one will not. And that is why in it such a situation in principle is intolerable. Even the minutes, which are spent by the worker on searching for the mechanic, cost thousands of rubles. Hence, it is also necessary to eliminate these losses.

Here the reckoning is in seconds. Thus, the worker who controls the module or flexible machine system (the operator) should be able himself to eliminate malfunctions.

[Question] That is, will is not be possible simply to push buttons even in an "unmanned" shop?

[Answer] It is better for whoever has gotten such an illusion to choose a different occupation, a little farther away from production.

Automated systems facilitate the labor of a worker, but do not simplify it. This is the most important thing: to learn clearly what demands modern production makes. They are incomparably greater than before.

Yes, we say that we are striving for the creation of "unmanned" works. But "unmanned" is rather an image, and it literally applies only to machine tool operators. The need for them will actually disappear. But it will not be possible to manage entirely without workers.

[Question] Apparently, "other" workers.

[Answer] Yes, they should have knowledge on an order, on several orders higher.

First, the equipment of the new generation is incomparably more complex. It is necessary to have a thorough understanding of electronics, the principles of operation, the working principle of automatic machine tools, robots, and automated systems. Second, as I have already said, the consequences of malfunctions--both economic and technical and technological--are much more serious.

The worker should know the entire system as a whole and each section of it separately and be able to foresee the consequences and to determine the cause of trouble. And what is most important of all--be able to eliminate any malfunction independently.

He should actually use knowledge at the level of, perhaps, a modern engineer and the practical skills of a worker of the highest skill. That is, both a capable head and skillful hands are equally important to him.

[Question] So, it turns out, have the endless justifications of slack pupils--"School knowledge is of no use to me, they will hire me at the plant like that"--already become obsolete?

[Answer] Exactly! I am afraid that not only school children, but also the educators who divide pupils into those, who aspire to a higher educational institutions, and those, to whom "it makes no difference to go to a vocational and technical school, hence, it is also no good to torment them with the sciences," poorly imagine to what extent this division has become obsolete.

[Question] But will today's school children really not get places at simple general-purpose machine tools?

[Answer] At the beginning of their labor life, perhaps, they will. It is still a little early to remove the billboards with the inscription "Wanted..." from the gates of enterprises.

But what then? The Intensification-90 Program, the Intensification-2000 Program, which is already in the works, and the long-range plans of economic and social development to the beginning of the 21st century answer this question quite specifically. Basic technical solutions are being developed and tested during the present five-year plan. While having accumulated them, during the 13th and 14th Five-Year Plans we will be able to completely reequip production, by duplicating and developing what will succeed customary equipment and technology.

Thus, the basic worker's occupation of the future is obviously not the machine tool operator, and even not the operator, but the broad specialist in the maintenance of automated production systems. Young people also need to prepare for this--if they do not want to subject themselves to a period as a student at a mature age. This is a task not for tomorrow, but already for today.

[Question] So far we have been speaking about those who will choose worker's occupations. But what are the criteria of choice of the children who are thinking of going to technical higher educational institutions?

[Answer] The reorganization of engineering labor is an urgent question for our economy. The prestige of the engineer has decreased, his labor is losing its creative nature and is becoming more and more "paper" labor. There are a number of reasons for that.

One of them is quite objective and natural: the modern design engineer has to "digest" such an amount of information that on account of studying all kinds of documents he actually does not have either the strength or the time for creative work. Mountains, accumulations of reference works with all-union state standards and norms! Many years are required in order to learn where to seek what. And often they judge an engineer as a specialist precisely by the ability to get his bearings in the boundless sea of documents and standards.

The new designer will not have to spend time on this science. All the information, which has been included in reference works, will go into the memory of a computer, it is a minute's job to retrieve the necessary information. Computer technology will also free the engineer from the making

of complicated drawings and cumbersome calculations--the main thing on which for the present time is being spent.

It is well known that the man-machine system increases the labor productivity of a designer by two- to threefold. While it is envisaged by the Intensification-90 Program to increase the output of computer-aided design systems by twofold. So that the complete reequipment of the workplaces of the designer is a quite close prospect.

When modern equipment frees the engineer from routine mechanical labor, he will be afforded the opportunity to think, to advance ideas, to create, that is, to engage in his immediate job, in accordance with which his professional qualities will also be evaluated.

So that a place will hardly be found for specialists in the examination of papers and the drawing up of documents among engineers of the future. Let the boys and girls, who intend to enroll in technical higher educational institutions, avail themselves of this warning.

[Question] Will scientific work, apparently, also be reorganized?

[Answer] Certainly. The main problem of science is the shortening of the time of research and the introduction of the results in production.

What is the difficulty here?

Of course, it is impossible to hurry an idea, when it has not yet emerged. But, as practical experience shows, the bulk of the time is being spent not on this. Lengthy calculations, numerous drawings, the preparation of the mockup, then the prototype, tests, and in accordance with the results of the tests again calculations, drawings, and so on (with the inevitable consultations at each stage). As a result, when you make an idea intelligible, you see how imperfect it is. But do not start everything all over again....

Modern automated systems of scientific research (ASNI) make it possible to get rid of this entire multistage means. The opportunity is even afforded to conduct tests and make adjustments, without having the item itself, and to do without drawings even when producing the prototype. This does not simply speed up the process of research. The automated system of scientific research makes it possible to study a large number of hypotheses and to choose almost without error the optimum version. The computer affords practically unlimited freedom to the inquisitive mind.

[Question] That is, is man been freed from routine for creative work?

[Answer] Yes, and it is possible only to envy current young people. It has befallen them to start the path of labor at a fortunate time. They can dispose themselves to creative work, but not reform for it.

Such short paths to the heights of research were not afforded many preceding generations. Now it is not necessary to spend time on acquiring routine, but

at one time necessary experience. Now let them also not waste time--let them search.

I will say frankly that now scientific organizations, design bureaus, and plant shops are interested first of all in an influx of young people who are free of the burden of obsolete methods, stereotypes of traditional thinking, and obsolete skills in work.

Never in history have there yet been such possibilities for the creative and practical development of young people. Time favors the young. But today's times are fast. And one should cultivate in oneself the qualities which conform to them.

[Question] And what are these qualities?

[Answer] The main one, in my opinion, is intellectual curiosity. The questions: What that way? Can it be done differently? should always arise. It is necessary to doubt obvious things--only in this way do productive ideas originate. It is necessary to believe in the unknown--and it will turn out that without you they were not able to hit upon much, many ideas have not yet been brought to a conclusion. For there is no limit to improvement....

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BIOGRAPHICAL INFORMATION

ALEKSANDR YEVSEYEVICH BRAUNSHTEYN OBITUARY

Moscow IZVESTIYA in Russian 6 Jul 86 p 6

[Article: "Academician Aleksandr Yevseyevich Braunshteyn"]

[Text] Soviet science has suffered a serious loss. Academician of the USSR Academy of Sciences and the USSR Academy of Medical Sciences Aleksandr Yevseyevich Braunshteyn, a prominent Soviet biochemist, Hero of Socialist Labor, winner of the Lenin Prize and the USSR State Prize, and chief of a laboratory of the Institute of Molecular Biology of the USSR Academy of Sciences, died after a lengthy grave illness.

A.Ye. Braunshteyn was born on 26 May 1902 in Kharkov is the family of a well-known ophthalmalogy professor. After graduating from the Kharkov Medical Institute he enrolled in graduate studies at the Institute of Biochemistry of the USSR Academy of Sciences in Moscow. With that time his fruitful scientific activity began.

A.Ye. Braunshteyn discovered the reaction of the enzymatic transport of the amino group (transamination). He advanced and substantiated experimentally the notion of the key (integrating) role of transamination reactions in metabolism and energy exchange in the cell. This concept was one of the most important contributions, which were made in the 20th century to the science of cellular metabolism.

The study of a number of new functions of vitamin $B_6$--pyridoxal phosphate--is connected with the name of A.Ye. Braunshteyn. He developed the general theory of the enzymatic reactions which occur with the involvement of this substance. This theory, which subsequently received experimental confirmation and general recognition, was a successful use of organic chemistry for the explanation of a wide range of enzymatic reactions.

Basic research on the structure and mechanisms of the action of a large group of enzymes, which catalyze conversions of amino acids in living organisms, was conducted under the supervision of A.Ye. Braunshteyn. This work made a major contribution to the knowledge of the general laws of enzymatic catalysis.

During the more than 60 years of his active scientific and public work A.Ye. Braunshteyn trained and educated several generations of Soviet biochemists.

The homeland rated highly the services of A.Ye. Braunshteyn and his tireless self-sacrificing labor, having conferred on him the title of Hero of Socialist Labor and having awarded him the Order of Lenin, three Orders of Labor Red Banner, and medals. He was elected an honorary member of scientific societies and academies of sciences of a number of countries. The blessed memory of A.Ye. Braunshteyn, an outstanding scientist and fine man, will live in the hearts of Soviet scientists.

[Signed] The Presidium of the USSR Academy of Sciences

The Presidium of the USSR Academy of Medical Sciences

The Biochemistry, Biophysics, and Chemistry of Physiologically Active Compounds of the USSR Academy of Sciences

The Institute of Molecular Biology of the USSR Academy of Sciences

The All-Union Biochemical Society

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